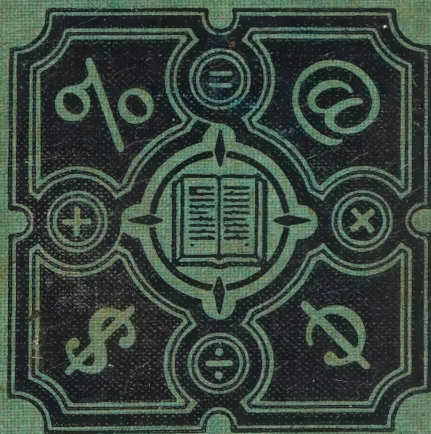


CLARK-OTIS-HATTON
**MODERN-SCHOOL
ARITHMETIC**
— — —
SECOND BOOK



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MODERN-SCHOOL ARITHMETIC

SECOND BOOK

BY

JOHN R. CLARK

THE LINCOLN SCHOOL OF TEACHERS COLLEGE

COLUMBIA UNIVERSITY

FORMERLY INSTRUCTOR IN THE TEACHING OF ARITHMETIC

CHICAGO NORMAL COLLEGE

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THE processes of arithmetic apply to our petty transactions, to the composition of the atom, and to the motions of the spheres. Indeed, the whole structure of our present civilization is built upon a foundation of mathematics. The study of this subject is of intense and universal interest when it is presented in a psychological way, which insures ease of comprehension and skill in the use of the concepts and processes of arithmetic. The authors of *Modern-School Arithmetic* have undertaken to provide a course of study in arithmetic embodying the accepted principles of the psychology of learning, thus making it most satisfying and useful to the pupil.

COHMSA: 2D BK,-1

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PREFACE

THE authors of *Modern-School Arithmetics* believe that the usefulness of a textbook in arithmetic is determined by the extent to which it is built upon valid principles of psychology. *Modern-School Arithmetics* are founded upon the ten cardinal principles described in the following paragraphs.

1. **Child experience and interests.** Any one familiar with the interests and activities of children has only to examine the developments and problems in this book to appreciate the extreme care the authors have taken to bring these within child experience. The users of the experimental edition have frequently commented upon the ease with which pupils have comprehended the developments and problems as a result of this feature.

2. **Guidance in problem solving.** Doubtless one of the greatest deficiencies of arithmetic textbooks in the past has been their failure to provide adequate, systematic instruction in problem solving. In these books the authors have made a specialty of teaching children how to solve problems, and have presented a great variety of methods. Needless to say, every one of these methods has been tried and found successful. In these techniques of teaching problem solving, special attention has been given to providing for individual differences.

3. **Finely graded steps in presentation.** One of the chief sources of difficulty of pupils in understanding arithmetic has been the practice on the part of textbooks of thrusting upon the pupils two or three new processes at once. The authors of these texts have made a special point of analyzing each general skill psychologically for the purpose of presenting it to the pupils one step at a time; that is, in each "step" only one new element is introduced. The aggregate number of separate steps in the presentation of topics in these books exceeds that of any other series. The most careful try-out has demonstrated that

Preface

in no place are the pupils given a larger bite than they can swallow.

4. **Abundance of practice material.** Experience teaches that even with the best of developments, pupils require ample practice for the mastery of concepts and skills in arithmetic. If this is not provided in the textbook, the teacher must use up a portion of her busy day in making up or searching for supplementary practice material. To relieve the teacher of this irksome duty, the authors have provided a great abundance of practice material, both verbal and abstract. Teachers will be glad to know that these books contain (by actual count) more practice material than any other three-book series.

5. **Diagnosis and remedial practice.** Doubtless the two greatest sources of waste in education are (1) the learning of things that are wrong and the consequent practice of error and necessary relearning, and (2) the over-practice on things that are already adequately learned. The authors have therefore introduced a means whereby the pupil may find out from time to time throughout the course "what he knows and what he doesn't know" in order that he may (1) discover and correct early any wrong learning or deficiency, and (2) avoid unnecessary over-practice on what he knows. The system of diagnosis has been worked out in great detail, so that for each specific deficiency the pupil is directed to a specific source of remedy. Here again individual differences are provided for. Moreover, all this is made practically automatic, so that a minimum amount of attention on the part of the teacher is required.

6. **Measurement of progress.** One of the greatest stimulants to learning is the conscious appreciation on the part of the pupil of his progress in the acquisition of knowledge. In order to take advantage of this fact, the authors have made it possible for the pupil to measure his progress at frequent intervals and to

Preface

record such progress in a vivid way. This is done by means of the Progress Tests (one at the end of each chapter) and the Progress Record (at the back of the book). Scientifically determined standards are provided for pupils of three general levels of ability.

7. **Experimental use before publication.** No series of textbooks can be accepted without hazard until after they have been subjected to actual classroom use and revised in the light of the criticisms of the teachers by whom they were used. The present edition of the books is the complete revision of the experimental edition, which was used by some 3000 children throughout the United States. The standards for the Progress Tests are based upon data submitted by the teachers of those children. The authors wish to take this opportunity to express their appreciation to the many teachers who coöperated in the experimental use of the books, for their searching criticisms and valuable suggestions.

In recognition of the fact that this text will be used by groups of children of widely varying ability, the authors have enriched the content so that it will meet the needs of the brighter groups and provide teachers of such groups with an ample amount of well-balanced teaching material. On the other hand, teachers of slower groups may omit that enriching material without detriment to the unity or coherence of the course and without lessening the chances of their pupils to measure up to the standards of the Progress Tests. It is recommended that teachers of slow groups and teachers of short-term schools omit starred pages.

JOHN R. CLARK
ARTHUR S. OTIS
CAROLINE HATTON

EDITOR'S PREFACE

THE writing of a superior set of textbooks in arithmetic is a rare achievement. A good arithmetic is made in the same way that an efficient automobile is achieved. The automobile industry first of all gets men of genius to design the machine. In the second place it invests money and effort in the laboratory and on the proving grounds. In this way the excellence of the new product is assured.

For precisely similar reasons the success of the Clark-Otis-Hatton arithmetics is assured. They have been produced by people with gifted pens and with the right training. The authorship combines (1) a keen, intimate insight into children's interests and capacities, making the books personal, engaging, and challenging; (2) an understanding of the psychology of acquiring meanings, insuring economical and thorough learning; and (3) broad scholarship in modern mathematical education, guaranteeing a happy relationship between the science of mathematics and the applications of the science to present-day social needs. This combination of qualities of authorship assures that the books are interesting to the pupil, easy to teach, effective in building up a sound mastery of the subject, and in harmony with modern educational theory and practice.

A complete printed experimental edition was tried out city-wide under the personal supervision of Miss Hatton. The city-wide trial under a supervisor who gives her full time to the study of pupil responses is undoubtedly an advance step in curricular research. In addition, the experimental edition was used and criticized by teachers of arithmetic in many cities. Consequently the teacher has the assurance that every unit is carefully developed in the light of the best modern practice and with a full knowledge of evidence secured through available investigations.

From my experience as a teacher and from the intimate knowledge of these books acquired by editing them, I predict that the Clark-Otis-Hatton arithmetics will be most favorably received by pupils, teachers, and students of education.

UNIVERSITY OF MICHIGAN

RALEIGH SCHORLING

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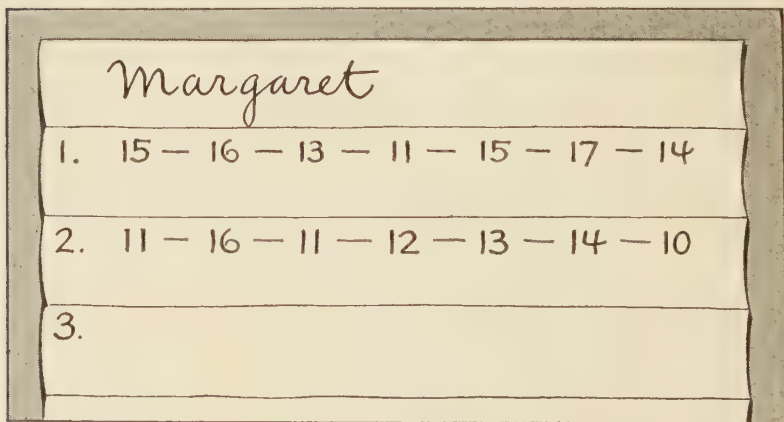
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To Save Copying



This picture shows how to write the answers to examples without copying them.



This picture shows how your paper will look. (Don't forget to number each row.)

It is a good idea to put dashes between answers.

GRADE FIVE

CHAPTER I

FUNDAMENTALS OF ARITHMETIC

Summer Camping



1. Tom went to a boys' camp this summer for two weeks. He had to pay \$10.00 a week for board; his carfare cost him \$2.47 each way; and he spent \$2.50 besides. Can you find how much his camping trip cost all together?

2. Tom had earned \$16.75. His father gave him the rest of the \$27.44. Do you know how much his father gave him?

3. There were 32 tents in the camp, with 4 boys in each tent. Do you know how many boys there were all together?

4. There were 16 camp leaders, each of whom had charge of the same number of boys. How many boys did each leader have in his charge?

5. Their tents were 9 ft. wide and 12 ft. long. How many square feet of floor space were there in each tent?

6. Their dining hall was 60 ft. long and 42 ft. wide. How many square feet was that?

7. There were 17 tables in the dining hall, with seats for 9 persons at each table. How many persons could be seated in the dining hall?

Daily Camp Program

A.M.	P.M.
Rising Bell 6:45	Rest 12:40-1:40
Setting-up Exercises . 7:10- 7:20	Hikes 1:40-3:50
Breakfast 7:30- 8:10	Swimming . . 3:50-4:30
"Clean-up" Time . . 8:10- 8:25	Free Time . . 4:30-5:30
Drill 8:25- 9:00	Supper 5:30-6:10
Athletic Contests . . 9:00- 9:35	Free Time . . 6:10-6:50
Free Time 9:35-10:20	Camp Fun . . 6:50-8:20
Nature Study . . . 10:20-10:50	Retiring Bell . 8:30-
Swimming 10:50-11:30	Silence 9:00
Free Time 11:30-12:00	
Dinner 12:00-12:40	

This program shows what the boys did at camp.

1. When Tom looked at it he said : "We swim only ____ minutes in the morning and ____ minutes in the afternoon. That makes ____ minutes all together, or ____ hour and ____ minutes."

2. Then he said : "They certainly expect us to sleep enough. We are in bed ____ hours and ____ minutes every night."

3. Do you know how long the boys had for "camp fun" every evening?

4. How long did the boys have for each meal? for all three meals?

5. The drill lasted from ____ minutes after ____ until ____ o'clock. That is ____ minutes.

6. Right after their athletic contests in the morning, they had "free time" from ____ minutes of ____ until ____ minutes after _____. How long is that?

7. How long did the boys have in the afternoon for their hikes?

Ordering Camp Food



One day Tom and some of the other boys saw some food orders the camp cook had made out. They asked the price of each item and figured out the bills. See if you can work out each bill correctly. (The sign @ means "at." If the food is bought by the *pound*, then "@ 30¢" means "at 30¢ a pound"; if the food is bought by the *quart*, then "@ 20¢" means "at 20¢ a quart"; etc.)

ORDER NO. I

30 lb. dried apples . . . @ 30¢
 66 lb. butter . . . @ 50¢
 30 lb. bacon . . . @ 30¢

ORDER NO. II

30 lb. cocoa . . . @ 35¢
 20 lb. crackers . . . @ 15¢
 250 lb. flour . . . @ 6¢

ORDER NO. III

45 lb. rolled oats . . . @ 12¢
 18 lb. peanut butter . . . @ 20¢
 215 lb. sugar . . . @ 7¢
 12 lb. tapioca . . . @ 8¢
 24 lb. corn meal . . . @ 6¢

ORDER NO. IV

4 qt. molasses . . . @ 20¢
 4 qt. vinegar . . . @ 15¢
 36 pkg. macaroni . . . @ 12¢

ORDER NO. V

18 bu. potatoes . . . @ \$1.50
 6 pkg. raisins . . . @ 12¢
 36 bars soap . . . @ 5¢

ORDER NO. VI

2 bottles vanilla . . . @ 42¢
 16 cans milk . . . @ 10¢
 20 doz. lemons . . . @ 28¢
 28 cans peas . . . @ 16¢
 12 cans pineapple . . . @ 18¢

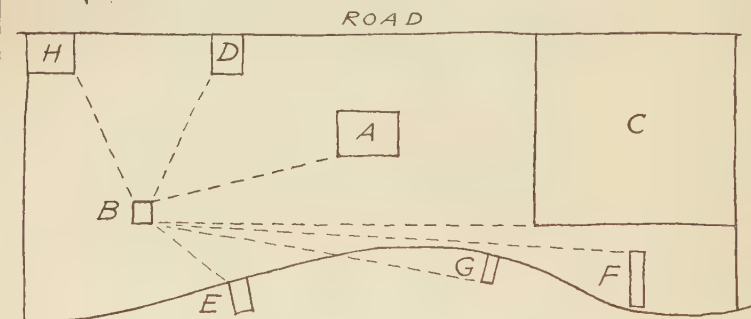
Drawing to Scale

JIMMY'S LETTER

Camp Snoquois,
Rockton, N.Y.
August 12, 1929.

Dear Bob,

I'm going to write you a very short letter to give you an idea of what our camp looks like. Each inch on my picture stands for 40 yards in the camp.



A Dining hall and lodge.

B My Tent.

C Baseball field.

D Shop.

E Dock.

F Rifle range.

G Diving board.

H Farmer's house.

We are having a fine time. I wish you were here too.

Your friend,
Jimmy.

When Bob received Jimmy's letter, he got out his ruler and measured to find out how far Jimmy's tent was from each of the other places mentioned on the map. Get your ruler and tell what Bob found out.

A Page of Numbers

1. Beginning with 2, count by 7's to 86.
2. Beginning with 1, count by 8's to 105.
3. Beginning with 3000, count by 100's to 4500.
4. Beginning with 45,500, count by 1000's to 55,500.
5. Beginning with 0, count by 25's to 500.
6. 873 is read ____ hundred seventy ____.
7. 1,643 is read ____ thousand, ____ hundred forty ____.
8. 18,700 is read ____ thousand, ____ hundred.
9. 212,857 is read ____ thousand, ____ hundred ____.
10. 1,204,300 is read ____ million, ____ thousand, ____ hundred.
11. 20,054,054 is read twenty ____, fifty-four ____, ____.
12. 25,700,009 is read ____ million, ____ thousand, ____.
13. Can you think of any reason why large numbers are divided into groups of three figures by commas? Where are the commas placed in a large number?
14. What is the largest number you can write with the figures 4, 3, 1, 5? the smallest?
15. What is the largest number you can write with the figures 2, 6, 7, 3, 4? the smallest?

Read these numbers :

- | | | |
|------------|---------------|----------------|
| 16. 867 | 21. 909,900 | 26. 30,604,905 |
| 17. 1,593 | 22. 3,604,308 | 27. 12,803,798 |
| 18. 4,860 | 23. 2,002,202 | 28. 90,000,009 |
| 19. 25,876 | 24. 4,007,006 | 29. 60,060,606 |
| 20. 54,390 | 25. 9,807,504 | 30. 73,054,982 |

31. Ask your teacher to dictate some other numbers for you to write in figures.

100 Addition Facts

(1) Give the answers to these combinations orally.

(2) Then see if you can write the answers to all the facts on folded paper in 5 minutes. If you make an error in any fact, study that fact and then take the whole test again. Keep practicing until you can answer every fact correctly.

1.	$\begin{array}{r} 7 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 9 \\ \hline \end{array}$
2.	$\begin{array}{r} 7 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 6 \\ \hline \end{array}$
3.	$\begin{array}{r} 1 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 1 \\ \hline \end{array}$
4.	$\begin{array}{r} 6 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 3 \\ \hline \end{array}$
5.	$\begin{array}{r} 8 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 0 \\ \hline \end{array}$
6.	$\begin{array}{r} 2 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 3 \\ \hline \end{array}$
7.	$\begin{array}{r} 7 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 3 \\ \hline \end{array}$
8.	$\begin{array}{r} 0 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 9 \\ \hline \end{array}$
9.	$\begin{array}{r} 5 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 9 \\ \hline \end{array}$
10.	$\begin{array}{r} 9 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 7 \\ \hline \end{array}$

Practice in Addition

Do you remember that in an addition example like this, the 463, 287, and 35 are called *addends*? The 785 is called the *sum*.

463
287
35
785

Do these examples orally. Be sure to notice all the different ways addition examples may be written.

1. $9 + 8 = \underline{\quad}$.
2. 4 and 9 are $\underline{\quad}$.
3. 7 more than 4 is $\underline{\quad}$.
4. 6 added to 8 is $\underline{\quad}$.
5. $8 + 3 + 4 + 2 = \underline{\quad}$.
6. Add 6 and 7.
7. 7 is 7 less than $\underline{\quad}$.
8. 9 plus 4 is $\underline{\quad}$.
9. 9, 8, and 3 together are $\underline{\quad}$.
10. 9 increased by 7 is $\underline{\quad}$.
11. The sum of 8 and 7 is $\underline{\quad}$.
12. The number which is 5 larger than 9 is $\underline{\quad}$.
13. The total of 6, 7, and 4 is $\underline{\quad}$.

14. $\begin{array}{r} 9 \\ 28 \end{array}$ $\begin{array}{r} 8 \\ 12 \end{array}$ $\begin{array}{r} 8 \\ 15 \end{array}$ $\begin{array}{r} 8 \\ 18 \end{array}$ $\begin{array}{r} 7 \\ 16 \end{array}$ $\begin{array}{r} 6 \\ 18 \end{array}$ $\begin{array}{r} 4 \\ 28 \end{array}$ $\begin{array}{r} 7 \\ 27 \end{array}$ $\begin{array}{r} 5 \\ 16 \end{array}$ $\begin{array}{r} 6 \\ 35 \end{array}$

15. $\begin{array}{r} 8 \\ 72 \end{array}$ $\begin{array}{r} 6 \\ 49 \end{array}$ $\begin{array}{r} 4 \\ 27 \end{array}$ $\begin{array}{r} 1 \\ 49 \end{array}$ $\begin{array}{r} 7 \\ 48 \end{array}$ $\begin{array}{r} 7 \\ 36 \end{array}$ $\begin{array}{r} 8 \\ 36 \end{array}$ $\begin{array}{r} 6 \\ 24 \end{array}$ $\begin{array}{r} 5 \\ 48 \end{array}$ $\begin{array}{r} 5 \\ 49 \end{array}$

16. $\begin{array}{r} 3 \\ 49 \end{array}$ $\begin{array}{r} 7 \\ 39 \end{array}$ $\begin{array}{r} 8 \\ 37 \end{array}$ $\begin{array}{r} 7 \\ 54 \end{array}$ $\begin{array}{r} 4 \\ 48 \end{array}$ $\begin{array}{r} 6 \\ 54 \end{array}$ $\begin{array}{r} 2 \\ 49 \end{array}$ $\begin{array}{r} 3 \\ 28 \end{array}$ $\begin{array}{r} 4 \\ 49 \end{array}$ $\begin{array}{r} 5 \\ 56 \end{array}$

17. $\begin{array}{r} 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \end{array}$ $\begin{array}{r} 8 \\ 5 \\ 9 \\ 3 \\ 6 \\ 8 \end{array}$ $\begin{array}{r} 9 \\ 5 \\ 3 \\ 9 \\ 5 \\ 6 \end{array}$ $\begin{array}{r} 8 \\ 9 \\ 5 \\ 6 \\ 7 \\ 8 \end{array}$ $\begin{array}{r} 7 \\ 8 \\ 9 \\ 9 \\ 6 \\ 6 \end{array}$ $\begin{array}{r} 7 \\ 6 \\ 9 \\ 5 \\ 6 \\ 5 \end{array}$ $\begin{array}{r} 7 \\ 9 \\ 6 \\ 8 \\ 9 \\ 4 \end{array}$ $\begin{array}{r} 5 \\ 6 \\ 8 \\ 9 \\ 5 \\ 5 \end{array}$ $\begin{array}{r} 5 \\ 7 \\ 8 \\ 9 \\ 9 \\ 9 \end{array}$ $\begin{array}{r} 4 \\ 9 \\ 6 \\ 8 \\ 8 \\ 8 \end{array}$

Addition

Can you add and check these 8 examples in 4 minutes?

1.	2.	3.	4.	5.	6.	7.	8.
2	3	4	5	4	3	1	6
8	5	7	6	3	9	4	5
6	8	8	7	5	7	9	8
5	9	6	8	7	3	9	9
4	6	7	3	9	6	8	7
9	8	8	9	4	9	8	9
7	9	9	4	8	5	7	6
<u>6</u>	<u>7</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>8</u>	<u>7</u>	<u>6</u>

How many of these 7 examples can you get right in 4 minutes?

9.	10.	11.	12.	13.	14.	15.
22	35	16	18	24	53	83
38	87	89	78	77	98	92
55	38	35	40	65	20	54
96	54	86	85	90	75	83
87	76	74	70	87	63	76
<u>54</u>	<u>48</u>	<u>98</u>	<u>69</u>	<u>74</u>	<u>87</u>	<u>98</u>

Time yourself and see how long it takes you to find the 8 mistakes in these examples:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>
16.	89	89	80	805	600	930
	635	375	93	900	754	805
	89	804	854	876	683	67
	<u>475</u>	<u>69</u>	<u>679</u>	<u>549</u>	<u>859</u>	<u>759</u>
	1088	1337	1716	3030	2897	2561
17.	\$ 9.80	\$ 5.00	\$ 3.29	\$ 2.46	\$ 7.65	\$ 2.87
	5.07	8.75	8.76	8.73	3.98	3.59
	8.95	6.73	5.94	7.69	9.73	8.75
	<u>7.54</u>	<u>5.89</u>	<u>8.73</u>	<u>5.08</u>	<u>5.84</u>	<u>5.68</u>
	\$31.36	\$26.27	\$26.72	\$22.96	27.20	\$21.89

Timed Addition Tests

Here are 5 addition tests. Do not copy the examples. Use folded paper so that you can add them easily. Check each example by adding downward to see if you get the same answer you got when you added upward.

ADDITION TEST I ($\frac{1}{2}$ minute)

1. 48	2. 40	3. 86	4. 95	5. 72	6. 78	7. 90	8. 93
<u>31</u>	<u>56</u>	<u>33</u>	<u>42</u>	<u>93</u>	<u>30</u>	<u>35</u>	<u>65</u>

ADDITION TEST II (1 minute)

1. 72	2. 82	3. 66	4. 48	5. 78	6. 59	7. 54	8. 71
<u>78</u>	<u>89</u>	<u>89</u>	<u>62</u>	<u>65</u>	<u>58</u>	<u>87</u>	<u>89</u>

ADDITION TEST III ($1\frac{1}{2}$ minutes)

1. 73	2. 73	3. 54	4. 85	5. 4	6. 36	7. 67	8. 79
20	21	67	3	66	67	98	8
<u>36</u>	<u>45</u>	<u>89</u>	<u>67</u>	<u>95</u>	<u>20</u>	<u>54</u>	<u>60</u>

ADDITION TEST IV (4 minutes)

1. 3854	2. 5737	3. 27	4. 3256	5. 900	6. 3579
876	360	6350	60	8352	830
25	8432	287	697	976	754
<u>4739</u>	<u>5876</u>	<u>4983</u>	<u>9854</u>	<u>8394</u>	<u>7695</u>

ADDITION TEST V (4 minutes)

(Don't forget to write the dollar signs and cents points.)

1. \$1.53	2. \$5.98	3. \$4.87	4. \$9.00	5. \$25.00
4.98	.46	.95	2.00	2.98
6.07	2.97	.46	4.75	13.53
5.39	.08	5.87	.82	5.48
<u>.20</u>	<u>6.35</u>	<u>2.03</u>	<u>6.73</u>	<u>2.76</u>

100 Subtraction Facts

See the directions at the top of page 6.

1.	$\begin{array}{r} 6 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 5 \\ \hline \end{array}$
2.	$\begin{array}{r} 9 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 6 \\ \hline \end{array}$
3.	$\begin{array}{r} 3 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 4 \\ \hline \end{array}$
4.	$\begin{array}{r} 8 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 2 \\ \hline \end{array}$
5.	$\begin{array}{r} 10 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 4 \\ \hline \end{array}$
6.	$\begin{array}{r} 11 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 7 \\ \hline \end{array}$
7.	$\begin{array}{r} 12 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 6 \\ \hline \end{array}$
8.	$\begin{array}{r} 8 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 9 \\ \hline \end{array}$
9.	$\begin{array}{r} 15 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 6 \\ \hline \end{array}$
10.	$\begin{array}{r} 12 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 9 \\ \hline \end{array}$

Practice in Subtraction

4705
— 2673
2032

Do you remember that in a subtraction like this the 4705 is called the *minuend*? The 2673 is called the *subtrahend*. The 2032 is called the *difference* or *remainder*. The sign — is a minus sign and tells you

to subtract.

Do these subtraction examples orally:

- | | |
|--|---|
| <p>1. $17 - 8 = \underline{\quad}$.</p> <p>2. 9 from 15 is $\underline{\quad}$.</p> <p>3. 11 is $\underline{\quad}$ more than 6.</p> <p>4. 15 less 8 is $\underline{\quad}$.</p> <p>5. Subtract 5 from 13.</p> | <p>6. 6 is $\underline{\quad}$ less than 13.</p> <p>7. $14 - ? = 7$.</p> <p>8. 6 from 12 leaves $\underline{\quad}$.</p> <p>9. 16 and $\underline{\quad}$ more are 25.</p> <p>10. 23 is $\underline{\quad}$ greater than 17.</p> |
|--|---|
11. The difference between 10 and 4 is $\underline{\quad}$.
12. 13 minus 9 equals $\underline{\quad}$.
13. When 6 is taken from 10, the remainder is $\underline{\quad}$.
-
- | | | | | | | | | | | |
|-----|----------|-----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|-----------|
| 14. | 11 | 61 | 40 | 22 | 54 | 13 | 31 | 42 | 25 | 55 |
| | <u>7</u> | <u>54</u> | <u>35</u> | <u>16</u> | <u>48</u> | <u>9</u> | <u>28</u> | <u>36</u> | <u>18</u> | <u>48</u> |
-
- | | | | | | | | | | | |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 15. | 62 | 41 | 70 | 20 | 51 | 61 | 43 | 31 | 21 | 59 |
| | <u>54</u> | <u>36</u> | <u>64</u> | <u>14</u> | <u>45</u> | <u>56</u> | <u>36</u> | <u>27</u> | <u>18</u> | <u>54</u> |
-
- | | | | | | | | | | | |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 16. | 60 | 41 | 71 | 23 | 53 | 63 | 33 | 70 | 26 | 55 |
| | <u>54</u> | <u>35</u> | <u>64</u> | <u>16</u> | <u>45</u> | <u>56</u> | <u>28</u> | <u>63</u> | <u>18</u> | <u>49</u> |
-
- | | | | | | | | | | | |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 17. | 80 | 24 | 16 | 53 | 20 | 40 | 60 | 32 | 23 | 50 |
| | <u>72</u> | <u>21</u> | <u>14</u> | <u>49</u> | <u>18</u> | <u>36</u> | <u>56</u> | <u>28</u> | <u>18</u> | <u>48</u> |
-
- | | | | | | | | | | | |
|-----|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 18. | 21 | 16 | 52 | 37 | 52 | 20 | 50 | 27 | 51 | 33 |
| | <u>16</u> | <u>9</u> | <u>49</u> | <u>32</u> | <u>45</u> | <u>16</u> | <u>45</u> | <u>18</u> | <u>48</u> | <u>27</u> |
-
- | | | | | | | | | | | |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 19. | 29 | 78 | 79 | 67 | 46 | 37 | 66 | 28 | 18 | 24 |
| | <u>28</u> | <u>72</u> | <u>73</u> | <u>64</u> | <u>42</u> | <u>36</u> | <u>64</u> | <u>24</u> | <u>16</u> | <u>21</u> |

Timed Subtraction Tests

Here are five subtraction tests. Do not copy the examples. Write your answers on folded paper. Check each answer by adding the remainder and subtrahend to see if their sum equals the minuend.

SUBTRACTION TEST I (1 minute)

- | | | | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1. 79 | 2. 86 | 3. 127 | 4. 175 | 5. 147 | 6. 135 | 7. 108 | 8. 149 |
| <u>54</u> | <u>23</u> | <u>84</u> | <u>95</u> | <u>80</u> | <u>93</u> | <u>85</u> | <u>50</u> |

SUBTRACTION TEST II (1 minute)

- | | | | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1. 75 | 2. 60 | 3. 84 | 4. 111 | 5. 153 | 6. 140 | 7. 108 | 8. 103 |
| <u>47</u> | <u>51</u> | <u>55</u> | <u>35</u> | <u>94</u> | <u>63</u> | <u>99</u> | <u>25</u> |

SUBTRACTION TEST III ($1\frac{1}{2}$ minutes)

- | | | | | | | |
|-----------|------------|------------|------------|------------|------------|------------|
| 1. 141 | 2. 513 | 3. 920 | 4. 606 | 5. 1540 | 6. 921 | 7. 1223 |
| <u>97</u> | <u>428</u> | <u>766</u> | <u>348</u> | <u>875</u> | <u>196</u> | <u>376</u> |

SUBTRACTION TEST IV (2 minutes)

- | | | | | | |
|------------|-------------|------------|--------------|-------------|--------------|
| 1. 400 | 2. 6000 | 3. 6005 | 4. 35704 | 5. 49876 | 6. 76009 |
| <u>297</u> | <u>3476</u> | <u>458</u> | <u>27631</u> | <u>4325</u> | <u>43582</u> |

SUBTRACTION TEST V (2 minutes)

(Don't forget to put the dollar signs and cents points in the answers.)

- | | | | |
|--------------|---------------|--------------|---------------|
| 1. \$29.76 | 2. \$546.08 | 3. \$100.00 | 4. \$364.07 |
| <u>13.72</u> | <u>139.89</u> | <u>54.28</u> | <u>290.08</u> |

James's Bank Account *

1. James put \$16.50 in the bank in January, \$5.32 in February, and \$13.20 in March. How much had he in the bank then?

2. He earned \$19.75 in April. He is going to buy a pair of skates for \$4.98 and put the rest in the bank. How much will he have left to put in the bank?

3. How much will James have in the bank, counting the \$14.77 he has left from his April money and the \$35.02 he had in the bank before?

4. James is thinking about buying a bicycle that costs \$22.75. If he takes the money for that from the \$49.79 in his bank account, how much will he have left?

5. After he buys his bicycle, will he have enough money left to buy a 45-dollar radio? If he has more than enough, tell how much he would have left after he bought the radio. If he hasn't enough to buy the radio, tell how much more he needs.

6. James's father had \$986.23 in his bank account, but he drew out \$250. How much had he left in his account?

7. Mr. Finley has \$283.79 in his account. Mr. Baker has \$600 in his. How much more has Mr. Baker in the bank than Mr. Finley?

8. Mrs. Tucker had \$125.72 in the bank. She put in \$25.00 and \$15.25. Later she took out \$39.85. How much was left in her account then?

9. Harry has \$9.87 in his bank account. He wants to save enough to buy a \$35.00 radio. How much more must he save?

10. Henry has \$39.22 in his bank account. A year ago he had only \$15.89. How much more has he now than he had a year ago?

11. If any of the children in your room have bank accounts, make up some problems about those accounts.

* NOTE TO THE TEACHER. See last paragraph of Preface.

Practice in Multiplication

540
× 36
3 240
16 20
19,440

In this example the sign $\times$ tells you to multiply. It is read "times." The 540 is the *multiplicand*; the 36 is the *multiplier*; and the 19,440 is the *product*.

3240 and 1620 are called *partial products*. What does "partial" mean? Why are those numbers called *partial products*?

1. Turn back to page 6. Think of those 100 examples as multiplication combinations instead of as addition examples. Give all the answers orally. Then see if you can write the answers on folded paper in 5 minutes. Do not go on until you have written the whole hundred facts correctly.

2. Add 5 to each of these products:

9×7	7×5	9×3	7×7	7×4
8×6	6×3	8×7	6×6	9×4
8×8	9×9	7×6	4×7	6×9
8×9	9×6	7×9	9×5	7×8
5×8	9×8	9×3	8×4	8×2

3. Add 4 to each of the products in Ex. 2. Add 3; add 2.

Give the answers to these as fast as you can talk:

4. $18 - 9 =$	5. $9 \times 9 =$	6. $9 \times 8 =$	7. $7 + 9 =$
$8 \times 0 =$	$6 + 8 =$	$8 \times 7 =$	$7 - 6 =$
$9 \times 0 =$	$9 + 0 =$	$9 - 0 =$	$9 - 9 =$
$0 \times 8 =$	$0 + 7 =$	$7 - 0 =$	$7 - 7 =$
$7 + 0 =$	$6 \times 0 =$	$0 \times 6 =$	$17 - 9 =$
$15 - 9 =$	$15 - 0 =$	$9 \times 7 =$	$9 - 7 =$
$16 - 8 =$	$17 - 9 =$	$9 + 6 =$	$6 + 7 =$
$9 \times 7 =$	$7 \times 7 =$	$6 \times 9 =$	$6 \times 7 =$
$8 + 6 =$	$7 + 9 =$	$9 - 6 =$	$7 - 6 =$
$8 \times 6 =$	$7 \times 9 =$	$9 \times 6 =$	$7 \times 6 =$
$8 - 6 =$	$9 - 7 =$	$6 + 9 =$	$7 - 7 =$
$6 \times 8 =$	$7 \times 9 =$	$6 \times 0 =$	$7 - 5 =$

Problem Solving

Solve each of the following problems and tell how you do each:

1. Find the cost of 5 articles at \$2.25 each.
2. Find the total cost of a 70-cent book, a 30-cent notebook, a 65-cent box of writing paper, and a 92-cent knife.
3. In an arithmetic test Alice did 5 addition examples the first minute, 5 subtraction examples the second minute, 5 multiplication examples the third minute, and 5 division examples the fourth minute. How many examples did she do?
4. In a spelling examination of 60 words Mark had 13 words wrong. How many had he right?
5. Our automobile registered 2009 miles on Monday. On Thursday it registered 2708 miles. The car had run ____ miles since Monday.
6. A man bought a \$750.00 automobile and paid \$425.50 on it. How much did he still owe?
7. There were 980 men, 860 women, and 799 children who attended a county fair during one day. How many people attended all together?
8. We pay \$27.50 every month for rent for our house. How much do we pay during the whole year?
9. Mr. Jones is paid \$4.25 a day. He worked 26 days during December. How much was he paid during the month?
10. At the rate of 6 apples for a quarter, how much will a dozen apples cost?
11. Ted bought a dozen oranges at 40¢ a dozen, and sold them for 5¢ each. How much did he make on them?
12. A grocery store made the following sales of sugar during one week: Monday, \$73.80; Tuesday, \$83.60; Wednesday, \$92.48; Thursday, \$64.70; Friday, \$75.07; Saturday, \$47.24. What were the total sales for the week?

Helpful Oral Practice in Multiplication

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>
1.	$\begin{array}{r} 28 \\ \underline{2} \end{array}$	$\begin{array}{r} 45 \\ \underline{8} \end{array}$	$\begin{array}{r} 27 \\ \underline{3} \end{array}$	$\begin{array}{r} 56 \\ \underline{4} \end{array}$	$\begin{array}{r} 36 \\ \underline{7} \end{array}$	$\begin{array}{r} 18 \\ \underline{7} \end{array}$	$\begin{array}{r} 49 \\ \underline{1} \end{array}$	$\begin{array}{r} 27 \\ \underline{4} \end{array}$	$\begin{array}{r} 63 \\ \underline{8} \end{array}$	$\begin{array}{r} 28 \\ \underline{5} \end{array}$
2.	$\begin{array}{r} 16 \\ \underline{4} \end{array}$	$\begin{array}{r} 35 \\ \underline{6} \end{array}$	$\begin{array}{r} 18 \\ \underline{4} \end{array}$	$\begin{array}{r} 36 \\ \underline{4} \end{array}$	$\begin{array}{r} 54 \\ \underline{8} \end{array}$	$\begin{array}{r} 14 \\ \underline{6} \end{array}$	$\begin{array}{r} 56 \\ \underline{7} \end{array}$	$\begin{array}{r} 24 \\ \underline{6} \end{array}$	$\begin{array}{r} 48 \\ \underline{5} \end{array}$	$\begin{array}{r} 16 \\ \underline{6} \end{array}$
3.	$\begin{array}{r} 49 \\ \underline{5} \end{array}$	$\begin{array}{r} 64 \\ \underline{7} \end{array}$	$\begin{array}{r} 27 \\ \underline{6} \end{array}$	$\begin{array}{r} 18 \\ \underline{8} \end{array}$	$\begin{array}{r} 16 \\ \underline{7} \end{array}$	$\begin{array}{r} 72 \\ \underline{8} \end{array}$	$\begin{array}{r} 16 \\ \underline{5} \end{array}$	$\begin{array}{r} 36 \\ \underline{6} \end{array}$	$\begin{array}{r} 18 \\ \underline{6} \end{array}$	$\begin{array}{r} 48 \\ \underline{3} \end{array}$
4.	$\begin{array}{r} 27 \\ \underline{7} \end{array}$	$\begin{array}{r} 28 \\ \underline{4} \end{array}$	$\begin{array}{r} 56 \\ \underline{6} \end{array}$	$\begin{array}{r} 36 \\ \underline{5} \end{array}$	$\begin{array}{r} 45 \\ \underline{7} \end{array}$	$\begin{array}{r} 24 \\ \underline{7} \end{array}$	$\begin{array}{r} 36 \\ \underline{8} \end{array}$	$\begin{array}{r} 18 \\ \underline{2} \end{array}$	$\begin{array}{r} 45 \\ \underline{5} \end{array}$	$\begin{array}{r} 28 \\ \underline{6} \end{array}$
5.	$\begin{array}{r} 64 \\ \underline{6} \end{array}$	$\begin{array}{r} 35 \\ \underline{5} \end{array}$	$\begin{array}{r} 48 \\ \underline{7} \end{array}$	$\begin{array}{r} 27 \\ \underline{5} \end{array}$	$\begin{array}{r} 18 \\ \underline{3} \end{array}$	$\begin{array}{r} 45 \\ \underline{6} \end{array}$	$\begin{array}{r} 63 \\ \underline{7} \end{array}$	$\begin{array}{r} 27 \\ \underline{8} \end{array}$	$\begin{array}{r} 49 \\ \underline{3} \end{array}$	$\begin{array}{r} 48 \\ \underline{4} \end{array}$
6.	$\begin{array}{r} 54 \\ \underline{7} \end{array}$	$\begin{array}{r} 18 \\ \underline{5} \end{array}$	$\begin{array}{r} 48 \\ \underline{2} \end{array}$	$\begin{array}{r} 56 \\ \underline{5} \end{array}$	$\begin{array}{r} 49 \\ \underline{4} \end{array}$	$\begin{array}{r} 28 \\ \underline{3} \end{array}$	$\begin{array}{r} 48 \\ \underline{6} \end{array}$	$\begin{array}{r} 54 \\ \underline{6} \end{array}$	$\begin{array}{r} 49 \\ \underline{2} \end{array}$	$\begin{array}{r} 16 \\ \underline{3} \end{array}$
7.	$\begin{array}{r} 63 \\ \underline{2} \end{array}$	$\begin{array}{r} 45 \\ \underline{4} \end{array}$	$\begin{array}{r} 32 \\ \underline{5} \end{array}$	$\begin{array}{r} 14 \\ \underline{2} \end{array}$	$\begin{array}{r} 25 \\ \underline{1} \end{array}$	$\begin{array}{r} 45 \\ \underline{3} \end{array}$	$\begin{array}{r} 32 \\ \underline{4} \end{array}$	$\begin{array}{r} 20 \\ \underline{2} \end{array}$	$\begin{array}{r} 64 \\ \underline{1} \end{array}$	$\begin{array}{r} 72 \\ \underline{2} \end{array}$
8.	$\begin{array}{r} 27 \\ \underline{1} \end{array}$	$\begin{array}{r} 42 \\ \underline{6} \end{array}$	$\begin{array}{r} 64 \\ \underline{3} \end{array}$	$\begin{array}{r} 16 \\ \underline{1} \end{array}$	$\begin{array}{r} 42 \\ \underline{3} \end{array}$	$\begin{array}{r} 35 \\ \underline{2} \end{array}$	$\begin{array}{r} 24 \\ \underline{2} \end{array}$	$\begin{array}{r} 75 \\ \underline{9} \end{array}$	$\begin{array}{r} 70 \\ \underline{8} \end{array}$	$\begin{array}{r} 69 \\ \underline{5} \end{array}$
9.	$\begin{array}{r} 99 \\ \underline{8} \end{array}$	$\begin{array}{r} 39 \\ \underline{7} \end{array}$	$\begin{array}{r} 54 \\ \underline{9} \end{array}$	$\begin{array}{r} 69 \\ \underline{6} \end{array}$	$\begin{array}{r} 80 \\ \underline{7} \end{array}$	$\begin{array}{r} 50 \\ \underline{9} \end{array}$	$\begin{array}{r} 76 \\ \underline{8} \end{array}$	$\begin{array}{r} 84 \\ \underline{7} \end{array}$	$\begin{array}{r} 69 \\ \underline{5} \end{array}$	$\begin{array}{r} 79 \\ \underline{7} \end{array}$
10.	$\begin{array}{r} 83 \\ \underline{9} \end{array}$	$\begin{array}{r} 74 \\ \underline{7} \end{array}$	$\begin{array}{r} 76 \\ \underline{9} \end{array}$	$\begin{array}{r} 89 \\ \underline{6} \end{array}$	$\begin{array}{r} 84 \\ \underline{7} \end{array}$	$\begin{array}{r} 67 \\ \underline{7} \end{array}$	$\begin{array}{r} 67 \\ \underline{4} \end{array}$	$\begin{array}{r} 99 \\ \underline{9} \end{array}$	$\begin{array}{r} 88 \\ \underline{8} \end{array}$	$\begin{array}{r} 77 \\ \underline{7} \end{array}$

Timed Multiplication Tests

Here are 5 multiplication tests. Do not copy the examples. Write your answers on folded paper. Check each example by going over your work.

MULTIPLICATION TEST I (2 minutes)

- | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|
| 1. 76 | 2. 89 | 3. 79 | 4. 87 | 5. 69 | 6. 87 | 7. 75 | 8. 96 |
| <u>5</u> | <u>4</u> | <u>6</u> | <u>9</u> | <u>8</u> | <u>6</u> | <u>9</u> | <u>6</u> |

MULTIPLICATION TEST II (4 minutes)

- | | | | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1. 98 | 2. 67 | 3. 87 | 4. 97 | 5. 74 | 6. 98 | 7. 77 | 8. 96 |
| <u>55</u> | <u>95</u> | <u>96</u> | <u>58</u> | <u>78</u> | <u>94</u> | <u>94</u> | <u>38</u> |

MULTIPLICATION TEST III (6 minutes)

- | | | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1. 579 | 2. 485 | 3. 486 | 4. 866 | 5. 358 | 6. 679 | 7. 754 |
| <u>93</u> | <u>97</u> | <u>57</u> | <u>69</u> | <u>68</u> | <u>84</u> | <u>59</u> |

MULTIPLICATION TEST IV (8 minutes)

- | | | | | | | |
|------------|------------|------------|------------|------------|------------|------------|
| 1. 679 | 2. 225 | 3. 332 | 4. 730 | 5. 211 | 6. 245 | 7. 526 |
| <u>843</u> | <u>274</u> | <u>126</u> | <u>172</u> | <u>375</u> | <u>941</u> | <u>242</u> |

MULTIPLICATION TEST V (5 minutes)

- | | | | | | | |
|------------|------------|------------|------------|------------|-------------|------------|
| 1. 865 | 2. 509 | 3. 427 | 4. 730 | 5. 709 | 6. 432 | 7. 765 |
| <u>700</u> | <u>673</u> | <u>205</u> | <u>754</u> | <u>605</u> | <u>6000</u> | <u>207</u> |

90 Division Facts

See the directions at the top of page 6.

1. $5 \overline{)30}$ $2 \overline{)18}$ $1 \overline{)4}$ $5 \overline{)25}$ $3 \overline{)0}$ $7 \overline{)35}$ $1 \overline{)5}$ $4 \overline{)8}$ $9 \overline{)0}$

2. $1 \overline{)3}$ $5 \overline{)35}$ $3 \overline{)3}$ $9 \overline{)81}$ $7 \overline{)42}$ $8 \overline{)8}$ $7 \overline{)28}$ $8 \overline{)0}$ $4 \overline{)12}$

3. $3 \overline{)6}$ $2 \overline{)16}$ $5 \overline{)40}$ $7 \overline{)49}$ $1 \overline{)2}$ $8 \overline{)16}$ $4 \overline{)16}$ $9 \overline{)9}$ $7 \overline{)21}$

4. $2 \overline{)14}$ $3 \overline{)9}$ $7 \overline{)56}$ $5 \overline{)45}$ $9 \overline{)72}$ $6 \overline{)0}$ $8 \overline{)24}$ $7 \overline{)14}$ $5 \overline{)20}$

5. $1 \overline{)1}$ $7 \overline{)63}$ $3 \overline{)12}$ $5 \overline{)15}$ $4 \overline{)20}$ $7 \overline{)7}$ $9 \overline{)63}$ $6 \overline{)6}$ $8 \overline{)32}$

6. $8 \overline{)56}$ $2 \overline{)12}$ $5 \overline{)10}$ $4 \overline{)24}$ $7 \overline{)0}$ $9 \overline{)54}$ $6 \overline{)12}$ $3 \overline{)15}$ $8 \overline{)40}$

7. $2 \overline{)10}$ $5 \overline{)5}$ $4 \overline{)28}$ $6 \overline{)54}$ $9 \overline{)45}$ $6 \overline{)18}$ $4 \overline{)4}$ $3 \overline{)18}$ $8 \overline{)48}$

8. $5 \overline{)0}$ $4 \overline{)32}$ $6 \overline{)48}$ $9 \overline{)36}$ $6 \overline{)24}$ $1 \overline{)6}$ $3 \overline{)21}$ $2 \overline{)2}$ $1 \overline{)0}$

9. $4 \overline{)36}$ $6 \overline{)42}$ $9 \overline{)27}$ $6 \overline{)30}$ $2 \overline{)8}$ $4 \overline{)0}$ $8 \overline{)64}$ $2 \overline{)0}$ $3 \overline{)24}$

10. $6 \overline{)36}$ $2 \overline{)6}$ $1 \overline{)7}$ $9 \overline{)18}$ $1 \overline{)8}$ $8 \overline{)72}$ $2 \overline{)4}$ $1 \overline{)9}$ $3 \overline{)27}$

Division Practice

$$\begin{array}{r} 7 \overline{)4957} \\ \underline{7081} \\ 1 \end{array}$$

Do you remember that in a division example like this, the 4957 is called the *dividend*, the 7 is called the *divisor*, and the $708\frac{1}{7}$ is called the *quotient*?

Notice that the remainder 1 is written over the divisor to form a fraction.

The sign $\div$ tells you to divide.

Do these divisions as quickly and carefully as you can:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>
1.	$8 \overline{)41}$	$5 \overline{)46}$	$6 \overline{)57}$	$7 \overline{)39}$	$8 \overline{)76}$	$7 \overline{)48}$	$9 \overline{)50}$	$7 \overline{)61}$	$4 \overline{)35}$	$7 \overline{)53}$

2.	$8 \overline{)36}$	$7 \overline{)33}$	$9 \overline{)87}$	$6 \overline{)53}$	$9 \overline{)33}$	$7 \overline{)67}$	$5 \overline{)38}$	$9 \overline{)68}$	$6 \overline{)47}$	$5 \overline{)43}$
----	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------

3.	$9 \overline{)76}$	$6 \overline{)38}$	$8 \overline{)70}$	$6 \overline{)35}$	$4 \overline{)39}$	$8 \overline{)59}$	$5 \overline{)29}$	$9 \overline{)57}$	$4 \overline{)31}$	$3 \overline{)29}$
----	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------

4.	$8 \overline{)54}$	$5 \overline{)34}$	$9 \overline{)42}$	$8 \overline{)21}$	$8 \overline{)31}$	$3 \overline{)20}$	$4 \overline{)23}$	$6 \overline{)29}$	$9 \overline{)14}$	$5 \overline{)18}$
----	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------

5.	$9 \overline{)25}$	$4 \overline{)19}$	$2 \overline{)13}$	$7 \overline{)10}$	$3 \overline{)17}$	$7 \overline{)26}$	$7 \overline{)19}$	$9 \overline{)58}$	$6 \overline{)59}$	$7 \overline{)41}$
----	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------	--------------------

Notice the ways that division examples may be written.

6. $72 \div 9 = ?$

10. 6 in 36, ? times.

7. 81 divided by 9 is ?

11. $\frac{1}{8}$ of 40 is ?

8. There are ? 9's in 36.

12. $7 \overline{)63}$

9. 7 is contained in 28 ? times.

13. $21 \overline{)441}$

14. If 9 oranges cost 54¢, one orange costs $\frac{1}{9}$ of 54¢, or ____¢.

15. If Christmas-tree balls cost 5¢ each, for 45¢ I can buy as many balls as there are 5's in 45, which is ____ balls.

The Vegetable Garden*

1. Mr. Mann had a piece of land at the end of the yard, which he gave to his two children, Edith and Robert, for a vegetable garden. The piece of land is 30 ft. wide and 18 ft. long. It contains ____ sq. ft.

2. Edith and Robert divided the 540 sq. ft. of garden land equally. Each has ____ square feet of land.

3. Mr. Mann bought each of the children a 25-cent hoe, a 35-cent spade, a 50-cent fork, a 25-cent rake, and a 40-cent watering can. How much did those garden tools cost all together?

4. Edith bought 2 qt. of seed onions at 16¢ a quart. They yielded 192 onions. She tied the onions in bunches of 12 and sold them for 8¢ a bunch. How much did she gain on her onions? (That means how much more did she get for the onions than the seed cost?)

5. She also planted 35 tomato plants that cost 5¢ each. They yielded 120 lb. of tomatoes. She sold them at 6¢ a pound. How much did she gain on the tomatoes?

6. Since Edith gained \$.96 on her onions and \$5.45 on her tomatoes, how much did she gain on her garden all together?

7. Robert paid 10¢ for the lettuce seed he planted in his garden. He sold 108 heads of it for 5¢ a head. How much did he gain on the lettuce?

8. Robert also marketed 600 radishes. He tied them in bunches of 12 and sold them for 5¢ a bunch. He paid only 15¢ for the radish seed. How much did he gain on the radishes?

9. Since Robert gained \$5.30 on his lettuce and \$2.35 on his radishes, how much did he gain on his garden all together?

10. Edith gained \$6.41 on her garden. Robert gained \$7.65 on his. Who made more, Edith or Robert? How much more?

Checking Your Work

Every pupil should check every example that he works. Always remember that it is worse to leave a mistake uncorrected than not to do the example at all. Here are the ways to check addition, subtraction, multiplication, and division. Be sure to *check every example* you do from now on.

CHECKING ADDITION

276
547
860
1683

Add the columns upward. Then add them downward. If you get the same answer by adding both ways, it is probable that your answer is correct.

CHECKING SUBTRACTION

4000
2567
1433

After you have finished your subtraction, add the difference to the subtrahend. If their sum is equal to the minuend, your work is very likely correct. In this example does $1433 + 2567$ equal 4000?

CHECKING MULTIPLICATION

Work	Check
52	27
27	52
364	54
104	135
1404	1404

After you have finished a multiplication example, you may interchange the multiplier and multiplicand and multiply again. If the products in each case are the same, your answer is probably correct. Maybe your teacher would rather have you check your multiplication by just going over your work again. If so, use that method.

Work	Check
33 r3	54
54)1785	33
162	162
165	162
162	1782
3	3
	1785

CHECKING DIVISION

After you have finished a division example, multiply the quotient by the divisor. To this product add the remainder. If that sum equals the dividend, your answer is probably correct.

Long Division

Do you remember enough about long division to explain each step of the division at the bottom of page 21? Divide and check these four easy examples :

$$(1) \ 21 \overline{)507} \qquad (2) \ 21 \overline{)996} \qquad (3) \ 41 \overline{)1275} \qquad (4) \ 42 \overline{)1388}$$

Pupils who do good work in division are always careful to put the first quotient figure in the right place.

3
$22 \overline{)728}$

In this example you first divide 22 into 72; so the 3 is written in the quotient over the 2 of the 72. Finish the example.

2
$51 \overline{)1083}$

In this example you first divide 51 into 108; so the 2 is written in the quotient over the 8 of the 108. Finish the example.

The first quotient figure should be written over the last figure of the part of the quotient that is needed to contain the divisor.

Do these divisions, being careful to place the first quotient figure correctly. Check each example.

$$1. \ 41 \overline{)578} \qquad 61 \overline{)3782} \qquad 81 \overline{)3645} \qquad 41 \overline{)2789} \qquad 65 \overline{)3449}$$

$$2. \ 21 \overline{)567} \qquad 31 \overline{)2387} \qquad 51 \overline{)3979} \qquad 52 \overline{)1666} \qquad 50 \overline{)1971}$$

$$3. \ 13 \overline{)143} \qquad 21 \overline{)9681} \qquad 22 \overline{)6864} \qquad 91 \overline{)6552} \qquad 75 \overline{)4583}$$

$$4. \ 82 \overline{)6806} \qquad 92 \overline{)7728} \qquad 93 \overline{)5952} \qquad 83 \overline{)6142} \qquad 94 \overline{)4043}$$

A DIVISION TEST

$$1. \ 21 \overline{)462} \qquad 2. \ 31 \overline{)967} \qquad 3. \ 91 \overline{)3915} \qquad 4. \ 71 \overline{)2417}$$

$$5. \ 87 \overline{)5568}$$

$$6. \ 95 \overline{)7889}$$

$$7. \ 74 \overline{)6885}$$

A Page of Division

$47 \overline{)82}$ James was working this example. He thought: 4 in 8 ____ times. $2 \times 47 = \underline{\hspace{1cm}}$. 94 cannot be subtracted from 82. 2 is too large for the quotient figure. I'll try 1. $1 \times 47 = \underline{\hspace{1cm}}$. 47 can be subtracted from 82. 1 is correct as the first figure in the quotient.

Do these divisions, checking each example:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
1. $25 \overline{)67}$	$66 \overline{)125}$	$57 \overline{)246}$	$96 \overline{)473}$	$53 \overline{)108}$
2. $34 \overline{)62}$	$66 \overline{)327}$	$57 \overline{)200}$	$92 \overline{)473}$	$95 \overline{)367}$
3. $28 \overline{)57}$	$32 \overline{)132}$	$63 \overline{)493}$	$78 \overline{)385}$	$26 \overline{)106}$
4. $49 \overline{)82}$	$45 \overline{)264}$	$61 \overline{)493}$	$38 \overline{)208}$	$37 \overline{)139}$
5. $38 \overline{)1938}$	$37 \overline{)2352}$	$46 \overline{)3793}$	$57 \overline{)4731}$	$68 \overline{)5632}$
6. $47 \overline{)3055}$	$59 \overline{)3784}$	$38 \overline{)1634}$	$79 \overline{)6541}$	$68 \overline{)5734}$

A LONG-DIVISION TEST

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. $58 \overline{)4139}$ | 2. $49 \overline{)3072}$ | 3. $79 \overline{)6454}$ | 4. $57 \overline{)4737}$ |
| 5. $46 \overline{)3852}$ | 6. $68 \overline{)5802}$ | 7. $37 \overline{)2350}$ | |

A SHORT-DIVISION TEST

- | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | <i>e</i> | <i>f</i> |
|-------------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
| 1. $8 \overline{)728}$ | $9 \overline{)6480}$ | $5 \overline{)2735}$ | $8 \overline{)3553}$ | $6 \overline{)25926}$ | $9 \overline{)63729}$ |
| 2. $9 \overline{)648}$ | $6 \overline{)2635}$ | $7 \overline{)2873}$ | $9 \overline{)8562}$ | $7 \overline{)70154}$ | $5 \overline{)50275}$ |
| 3. $6 \overline{)2466}$ | $9 \overline{)5672}$ | $7 \overline{)294}$ | $7 \overline{)7021}$ | $8 \overline{)6456}$ | $9 \overline{)8195}$ |

Telling What You Think

1. If a half-dozen pineapples cost \$1.08, what does one pineapple cost?

In order to work this problem you think : Since 6 pineapples cost \$1.08, one pineapple will cost $\frac{1}{6}$ of \$1.08. So I must divide \$1.08 by 6. \$1.08 divided by 6 is ____.

Tell what you think as you work each of these problems :

2. How many 9-cent cantaloupes can you buy for \$1.35?

3. If one chocolate layer cake costs 80¢, how much will $2\frac{1}{2}$ cakes cost?

4. If you have saved \$1.25 toward a \$3.50 football, how much more money do you need in order to buy the football?

5. If a tennis racket costs \$4.50, a tennis net \$8.25, rubber-soled shoes \$1.50, and 3 tennis balls 50¢ each, how much will this tennis outfit cost?

6. If you get a dozen handkerchiefs in a box for \$2.40, how much does each handkerchief cost?

7. Jack is going on a fishing trip tomorrow. He would like to buy a 2-dollar rod, a 3-dollar reel, a 50-cent folder of hooks, and two 15-cent floats. How much would they all cost?

8. Jack's father gave him \$2.75. Can he buy the 2-dollar rod, the 50-cent folder of hooks, and the two 15-cent floats with that amount of money?

9. Billy is going camping with his family. They want to buy 4 folding chairs. They saw in a catalog that they can get 6 chairs for \$12.00. How much will the 4 chairs cost?

10. If oranges are selling at 3 for 10¢, how much will a dozen oranges cost? How much change would you get from a 5-dollar bill if you buy a dozen oranges?

11. If you buy 3 dozen oranges at 3 for 10¢, how much change will you get from \$2.00?

Summary

Solve and check each of these examples :

$$\begin{array}{r} 1. \quad 567 \\ 896 \\ 543 \\ 28 \\ 400 \\ \hline 59 \end{array}$$

$$2. \quad 63 \div 21$$

$$3. \quad 5768 - 2457$$

$$\begin{array}{r} 4. \quad 306 \\ \times 54 \\ \hline \end{array}$$

$$5. \quad 64 \overline{)1386}$$

$$6. \quad 48 \overline{)2976}$$

$$7. \quad 54 \overline{)1512}$$

$$\begin{array}{r} 8. \quad 765 \\ \times 307 \\ \hline \end{array}$$

$$9. \quad 3684 - 2755$$

$$10. \quad 63 \overline{)1710}$$

Tell how the blank spaces in these sentences should be filled in:

11. The answer in an addition example is called the ____.
12. The answer in a division example is called the ____.
13. 9 : 45 is ____ minutes of ____.
14. From 9 : 25 to 10 : 15 is ____ minutes.
15. 5280 feet equal one ____.
17. 1,303,300 is read . . .
16. 4,000,000 is read . . .
18. 6,500,500 is read . . .
19. The number that is 23 larger than 19 is ____.
20. 18 is ____ more than 11.
21. 7 more than 4 is ____.
22. 16 less 12 is ____.
23. In $56 \div 7 = 8$, the number ____ is the dividend.
24. The difference between 24 and 19 is ____.
25. Six times twenty-four equals ____.
26. In $7 \times 8 = 56$, the number ____ is the product.
27. $\frac{1}{9}$ of 108 is ____.
28. 8 is 9 less than ____.
29. To find the cost of 2 doz. flowers costing 4¢ each, you should multiply . . .
30. If 7 books cost \$3.50, to find the cost of one you should ____ \$3.50 by ____.
31. To find the difference between 354 and 628 you should . . .
32. To find the total cost of 6 differently priced articles you should ____.

Progress Test No. 1

Write only the answers to these examples on your test paper. Number each answer. You may use scratch paper if you need to. Remember that accuracy is very important ; so check your work. Record your score in the Progress Test Record at the back of the book.

1. Write in words : 214,056. 4. 8

2. Write in words : 30,400,404. 7

3. Find the sum of 963, 49, 824, and 76. 5

5. \$235.62 6. 6005

47.79 — 278

8.00 8

29.38 6

6.78

7. Find the difference between \$100.00 and \$67.67.

Multiply: 8. 98

57

9. 568

98

10. 769

898

Divide: 11. 9)70

12. 21)19992

13. 37)2368

14. Helen Brown's father earns \$45.00 a week ; that means he earns ____ a year. (52 wk. = 1 yr.)

15. Bob wants a tennis racket that costs \$5.50, a tennis net that costs \$7.50, 3 tennis balls that cost 45¢ each, and a pair of \$1.98 tennis shoes. The whole tennis outfit will cost ____.

16. Harold has two dollars. If he buys 2 films for his camera at 25¢ each and a quarter of a pound of 60-cent candy, how much money will he have left?

Standards: X, 13. Y, 10. Z, 8.

CHAPTER II

FRACTIONS

United States Money *



1. Donald has a dime-savings bank that holds 20 dimes. When he gets it full, he takes it to the First National Bank and puts in the ____ dollars.
2. Marie had 15 dimes in her savings bank. 15 dimes is ____ dollar and ____ cents.
3. Alma has a nickel-savings bank. She had 20 nickels in it when she took it to the bank. How many dollars are 20 nickels?
4. Robert had 8 dimes in his dime-savings bank and 8 nickels in his nickel-savings bank. That made ____ dollar and ____ cents all together.
5. Frank saved 12 quarters in his quarter-savings bank. How many dollars was that?
6. I heard a man say to the bank clerk as he handed the clerk a 5-dollar bill, "I'd like to have two dollars' worth of nickels, a dollar's worth of dimes, and the rest in quarters." I wonder how many of each coin the clerk gave him. Do you know?
7. Another man handed the clerk a 20-dollar bill and said, "May I please have two 5-dollar bills, 3 dollars' worth of half dollars, and the rest in quarters?" How many half dollars and quarters should he get?

Reading and Writing Amounts of Money

These amounts of money are copied from a newspaper. Can you read them?

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. \$9.75	\$2,000.08	\$6,950.70	\$.25
2. \$20.07	\$4,988.98	\$10,000.00	\$.12 $\frac{1}{2}$
3. \$76.67	\$7,606.96	\$6,876.08	\$.37 $\frac{1}{2}$
4. \$106.06	\$8,888.88	\$7,600.00	\$.62 $\frac{1}{2}$

5. Is \$1.00 the same as 100¢?
6. Is 225¢ the same as \$1.25?
7. Are 8 dimes and 6 nickels the same as \$1.00?
8. Is 12 $\frac{1}{2}$ ¢ the same as \$.12 $\frac{1}{2}$?
9. Is \$5.00 more than 16 quarters?

Write with dollar signs and cents points:

10. One hundred dollars.
11. Six hundred dollars and fifty cents.
12. Nine dollars and ninety-nine cents.
13. Eighty-seven and one-half cents.

Remember that in adding columns of money the dollar sign is placed only before the first addend and before the answer. The cents point is placed in each addend and in the answer. Keep the cents points in a straight column like this: 

\$428.32
36.18
500.00
\$964.50

Write in columns, add, and check:

14. \$304.72, \$756.35, \$480.40, and \$753.62.
15. \$1000, \$280.75, and \$50.60.
16. \$.49, \$.75, \$.08, \$.63, and \$.98.
17. 65¢, 39¢, 72¢, and 5¢.
18. 12 $\frac{1}{2}$ ¢, 20¢, and 37 $\frac{1}{2}$ ¢.

Making Change *



Sometimes Jack's father lets Jack help at the cashier's desk in his grocery store. When Jack is giving a customer change from a 1-dollar bill after a 57-cent purchase, this is what he does: First he says, "Fifty-seven." Then, handing the customer 3 cents, he says, "Sixty"; handing him a nickel, he says, "Sixty-five"; handing him a dime, he says, "Seventy-five"; and handing him a quarter, he says, "One dollar." He always gives the smallest number of coins possible. That is, he would give a dime and a nickel rather than three nickels for 15 cents change.

The amounts in the *A* columns below show how much the customers' bills were. The amounts in the *B* columns show how much the customers handed Jack. Tell what change he gave the customers and what he said as he handed it to them.

	<i>A</i>	<i>B</i>		<i>A</i>	<i>B</i>		<i>A</i>	<i>B</i>
1.	3¢	5¢	11.	87¢	\$1.00	21.	\$1.76	\$2.00
2.	7¢	10¢	12.	76¢	\$1.00	22.	\$1.18	\$2.00
3.	12¢	25¢	13.	73¢	\$1.00	23.	\$.65	\$2.00
4.	14¢	25¢	14.	65¢	\$1.00	24.	\$4.67	\$5.00
5.	16¢	25¢	15.	53¢	\$1.00	25.	\$2.07	\$5.00
6.	21¢	25¢	16.	49¢	\$1.00	26.	\$1.98	\$5.00
7.	21¢	50¢	17.	34¢	\$1.00	27.	\$.73	\$5.00
8.	37¢	50¢	18.	27¢	\$1.00	28.	\$8.87	\$10.00
9.	52¢	60¢	19.	18¢	\$1.00	29.	\$4.23	\$10.00
10.	61¢	75¢	20.	9¢	\$1.00	30.	\$1.16	\$10.00

Working for the Florist



The Saturday before Easter, Bobby took charge of a flower stand for a florist. The florist gave him the following records. He had to fill in the numbers in the last two columns when he had finished work Saturday night. How would you have filled the last two columns? Find the total of the last column.

	PLANTS	No. RECEIVED	No. LEFT	PRICE	No. SOLD	AMOUNT
1.	Hyacinths	10 pots	6 pots	75¢ a pot	4	\$3.00
2.	Tulips	15 pots	4 pots	90¢ a pot	_____	_____
3.	Lilies	10 pots	2 pots	95¢ a pot	_____	_____
4.	Jonquils	15 doz.	4 doz.	85¢ a doz.	_____	_____
5.	Narcissus	16 pots	3 pots	60¢ a pot	_____	_____
6.	Pansies	25 bunches	8 bunches	50¢ a bunch	_____	_____
7.	Sweet Peas	18 bunches	5 bunches	65¢ a bunch	_____	_____
8.	Geraniums	20 pots	9 pots	45¢ a pot	_____	_____
9.	Violets	10 bunches	0 bunches	\$1.00 a bunch	_____	_____
10.	Marigolds	12 doz.	2 doz.	70¢ doz.	_____	_____
11.	Roses	100	20	15¢ each	_____	_____

Using Money in Division

(1) Martha paid \$1.80 for a half-dozen drinking glasses for her mother's Christmas present. When Martha was unpacking them, she broke one. Do you know how to find out how much she must pay to replace the one glass?

$$\begin{array}{r} 6 \overline{) \$1.80} \\ \$30 \end{array}$$

This is the way she did it. She thought: Since 6 glasses cost \$1.80, one glass will cost $\frac{1}{6}$ of \$1.80, or ____¢.

(2) Alice is having a party. Her mother gave her \$1.20 to buy some flowers for the table. When Alice went to the florist's shop, she found that the roses she wanted cost 15¢ each. How many roses was she able to buy?

$$\begin{array}{r} 8 \\ 15 \overline{) 120} \\ \underline{120} \end{array}$$

This is the way she found out. She thought: Since one rose costs 15¢, I can buy as many roses for \$1.20 as there are 15's in 120, which is ____.

Tell what you think as you solve each of these problems:

1. I pay \$2.40 for a dozen teacups. How much is that for one cup?

2. If a pack of 50 cards costs \$1.00, each card in the pack costs ____¢.

3. At 25¢ each how many jumping jacks can you buy for \$2.25?

4. At 49¢ each how many dolls can be bought with a 5-dollar bill? How much change will there be?

5. Mary made 25 Easter eggs and sold them at 15¢ each. With the money she earned she bought books that cost her 95¢ each. Do you know how many books she was able to buy and how much money she had left?

6. Towels were advertised at 75¢ each, or \$8.40 a dozen. How much can be saved on each towel by buying them by the dozen?

Walter's Birthday Money *

1. Yesterday was Walter's birthday. His father gave him \$5.00, his mother gave him \$2.25, his aunt sent him \$2.00, and he earned \$.79 selling papers. How much money did he get during the day?

2. Last evening he bought a new electric bicycle light for \$2.25 and a bicycle siren for \$1.50 paying for them out of his \$10.04. Do you know how much money he had left then?

3. Three of Walter's quoits were broken. He bought three new ones. They cost 65¢ each. Had he enough money left out of his \$6.29 to buy a 5-dollar tennis racket?

4. After buying the quoits he saw a 2-dollar baseball bat that he liked. If he bought the bat with part of his \$4.34, how many rare stamps at 50¢ each could he buy for his stamp collection and how much money would he have left?

5. He bought the bat but not the stamps. Then he saw some baseballs that he liked. There were six of them in a box for \$4.50. He bought one of the balls and then paid \$1.25 for a pocket knife. How much money had he left from his \$2.34?

6. When Walter told his father he had spent all but ____¢ of his money, his father said, "That was very foolish. You should have saved at least \$5.00 of it." If he had saved \$5.00, tell which of the things he wanted he could have bought with the rest of the \$10.04 he received.

7. Walter's father said that when he was a boy he saved \$5.00 on each of his birthdays for 14 years. How much money did he save on those birthdays?

8. If Walter should get \$10.04 on his next 9 birthdays, and should save it all, how much would he save?

9. If he saved only \$5.00 on each of 9 birthdays, how much would he save?

Problem Study

Do the problems on this page. If you fail Example 1, do Example 1 on page 34. Then come back and try Example 1 on this page again. If you fail Example 2, do Example 2 on page 34; etc.

1. Robert has \$2.00. If he buys a 25-cent camera film and a 49-cent puzzle, how much money will he have left?

2. Harry picked 4 qt. of strawberries. He sold them for 18¢ a quart and spent the money for some magic tricks at 8¢ each. How many magic tricks could he buy?

3. Ted bought an old bicycle for \$10.00. He spent \$2.50 to have it repaired. Then he sold it for \$15.00. How much did he gain on it?

4. We are taking 2 doz. cans of milk when we go camping. If we use 3 cans a day, the milk will last us ____ days.

5. I can walk about 4 miles an hour. At that rate how long will it take me to walk 12 miles?

6. It took Joe 3 hours to walk 10 miles. How many miles an hour did he walk; that is, what was his average rate of walking?

7. Find the cost of painting a wall $10' \times 22'$ at 4¢ a square foot.

8. Roy's father had a 12-yd. ball of string. Roy asked his father for it, and his father said, "You may take $\frac{1}{3}$ of it." How many yards may Roy take?

9. When oranges are selling 2 for 5¢, how much will a dozen oranges cost?

10. Harry earned 75¢ on Monday, 95¢ on Tuesday, 60¢ on Wednesday, and 65¢ on Thursday. How much did he earn in the 4 days?

Problem Helps

If you did every problem on page 33 correctly, you need not do any of the problems on this page.

1. (a) Robert bought a 2-cent whistle and a 4-cent ball. Together they cost ____¢. (b) Robert paid for the whistle and the ball with a dime. His change should have been ____¢.

2. (a) If you sell 6 eggs at 3¢ apiece, you will get ____¢. (b) If you spend the 18¢ for 2-cent stamps, you can get ____ stamps.

3. (a) If you buy an old pair of skates for \$1.50 and have to spend 50¢ to have them sharpened, the skates cost you ____ all together. (b) Then, if you sell the skates for \$3.00, you get ____ more than you paid for them. So we say that you gained \$1.00.

4. We use 3 eggs for breakfast every morning. How long will a dozen eggs last us? 2 dozen eggs?

5. (a) I can walk 3 miles in an hour. How many stretches of 3 miles are there in 6 miles? How long does it take me to walk each 3-mile stretch? (b) How long does it take me to walk the 6 miles? to walk 9 miles? to walk 12 miles?

6. (a) If I walked 12 miles in 3 hours, in 1 hour I must have walked $\frac{1}{3}$ as far, or ____ miles. We say that my rate of walking was ____ miles an hour. (b) If I walk 12 miles in 4 hours, my rate of walking is ____ miles an hour.

7. (a) A wall 9 ft. high and 15 ft. long has an area of ____ sq. ft. (b) To paint 135 sq. ft. at 5¢ a square foot would cost ____.

8. Henry's father gave him 15¢ and said, "Give $\frac{1}{3}$ of this money to Jean." How much shall Henry give Jean?

9. (a) If 2 oranges cost 5¢, 4 oranges, which are twice as many as 2 oranges, will cost twice as much as 5¢, or ____¢. (b) When oranges are selling 2 for 5¢, what will 6 oranges cost?

10. If Harry earned 5¢, 6¢, 7¢, and 8¢, how much did he earn all together?

Common Uses of Fractions *

1. Mary must practice her music lesson an hour every day. She practiced a quarter of an hour before school this morning. What part of an hour did she have to practice later?

2. At noon she practiced another quarter of an hour. How much had she practiced all together then?

3. What part of an hour did she still have to practice?

4. After school she practiced another fifteen minutes. What part of an hour had she practiced all together then? She finished practicing in the evening. What part of an hour did she practice in the evening?

5. Mary's mother sent her to the store for a half gallon of vinegar. The storekeeper gave her ____ quarts of vinegar.

6. Mary's sister asked her for a half yard of her baby ribbon. She gave her sister ____ inches of ribbon.

7. Her sister used only half of the ribbon Mary gave her. Do you know what part of a yard she used and what part of a yard was left?

8. When Mary went to the store for a half pound of cheese, the store clerk gave her 9 ounces of cheese. Was that more or less than she asked for? How much?

9. If cheese costs 40¢ a pound, what does an 8-ounce piece of cheese cost?

10. Why is a twenty-five-cent piece called a quarter?

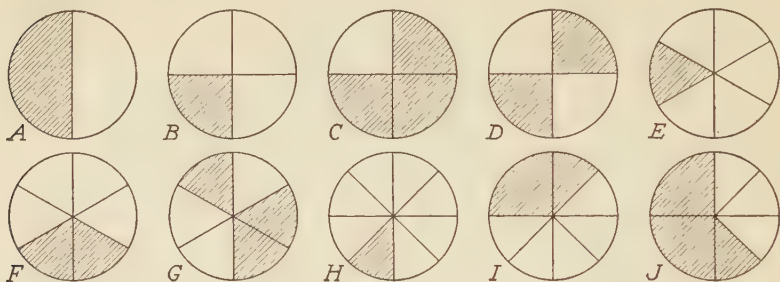
11. There are 8 qt. in a peck. If you get a quarter of a peck of beans, how many quarts do you get? How many quarts do you get if you buy a half peck?

12. If you were working in a candy store and some one asked for a quarter of a pound of chocolates, how many ounces would you give him?

13. How much would a quarter of a pound of 80-cent chocolates cost?

Fractions

1. These pictures show how Emily might divide a wafer. Tell what part of the wafer you would get if she should give you the shaded part shown at *A*, at *B*, *C*, *D*, *E*, *F*, *G*, *H*, *I*, *J*.



2. What part of the wafer will Emily have left in each case?

3. When any object is divided into two equal parts, each part is called ____ of the object.

4. When an object is divided into three equal parts, each part is called ____ of the object.

5. When an object is divided into four equal parts, each part is called ____ of the object.

6. When a number is divided into two equal parts, each part is called ____ of the number.

7. To find one half of a number you divide the number by ____.

8. To find one third of a number divide the number by ____.

9. To find one fourth of a number divide the number by ____.

Tell the answers to these examples:

10. $\frac{1}{2}$ of 12 = ?

15. $\frac{1}{6}$ of 246 = ?

20. $\frac{1}{8}$ of 336 = ?

11. $\frac{1}{6}$ of 18 = ?

16. $\frac{1}{7}$ of 217 = ?

21. $\frac{1}{5}$ of 265 = ?

12. $\frac{1}{5}$ of 30 = ?

17. $\frac{1}{9}$ of 198 = ?

22. $\frac{1}{2}$ of 336 = ?

13. $\frac{1}{4}$ of 36 = ?

18. $\frac{1}{4}$ of 152 = ?

23. $\frac{1}{9}$ of 837 = ?

14. $\frac{1}{8}$ of 64 = ?

19. $\frac{1}{6}$ of 258 = ?

24. $\frac{1}{8}$ of 664 = ?

Fractions

1. Into how many equal parts is this chocolate bar marked to be broken? What part of the bar is one of the equal parts? If I give you three of the equal parts, what part of the bar am I giving you?



In any fraction the two numbers which form it are called the *terms*. The *term* above the line is the *numerator*. The term below the line is the *denominator*.

$\frac{3}{5}$

3 ← Numerator
 5 ← Denominator

2. In the fraction $\frac{3}{5}$, the 3 is the ____ and the 5 is the ____.

3. If I gave you two of the equal parts of the chocolate bar, what part of the bar would I have given you? In that fraction ____ is the numerator and ____ is the denominator.

4. If I gave you $\frac{4}{5}$ of the chocolate bar, I would have $\frac{2}{5}$ left. What are the numerator and the denominator of the fractional part I would have left?

Do you notice that the denominator, 5, tells into how many equal parts the bar is divided? The numerator in each case tells how many of those parts you are thinking about.

5. (a) Into how many equal parts is this square divided? (b) How many parts are shaded? (c) How much of the square is shaded? (d) In your answer to (c), what is the numerator and what is the denominator?



6. Look at the figure above and complete: three fourths is ____ times as large as one fourth; one half is ____ times as large as one fourth.

Adding Fractions

May was making some clothes for her big doll. She asked her mother how much material to buy for a dress and an apron. Her mother said, "You ought to get $\frac{1}{2}$ yd. for the dress and $\frac{1}{4}$ yd. for the apron."

May said, "How much material is $\frac{1}{2}$ yd. and $\frac{1}{4}$ yd.?"

Can you answer her question by looking at the chart below?

1															
$\frac{1}{2}$								$\frac{1}{4}$							
$\frac{1}{4}$				$\frac{1}{4}$				$\frac{1}{4}$				$\frac{1}{4}$			
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$

$$\frac{1}{2} = \frac{?}{4}; \quad \frac{2}{4} + \frac{1}{4} = \frac{?}{4}.$$

With the help of the chart tell the missing numbers:

- | a | b | c | d |
|---|---|--|---|
| 1. $\frac{1}{2} = \frac{?}{4}$ | $\frac{1}{2} = \frac{?}{8}$ | $\frac{1}{4} = \frac{?}{8}$ | $\frac{3}{4} = \frac{?}{8}$ |
| 2. $\frac{1}{2} + \frac{1}{4} = \frac{?}{4}$ | $\frac{1}{2} + \frac{1}{8} = \frac{?}{8}$ | $\frac{1}{4} + \frac{1}{8} = \frac{?}{8}$ | $\frac{1}{2} + \frac{3}{8} = \frac{?}{8}$ |
| 3. $\frac{1}{4} + \frac{3}{8} = \frac{?}{8}$ | $\frac{1}{4} + \frac{5}{8} = \frac{?}{8}$ | $\frac{3}{4} + \frac{1}{8} = \frac{?}{8}$ | $\frac{1}{2} + \frac{1}{2} = \frac{?}{2}$ |
| 4. $\frac{1}{4} + \frac{1}{4} = \frac{?}{4} = \frac{?}{2}$ | | 8. $\frac{1}{16} + \frac{1}{8} = \frac{1}{16} + \frac{2}{16} = \frac{?}{16}$ | |
| 5. $\frac{5}{8} + \frac{1}{8} = \frac{?}{8} = \frac{?}{4}$ | | 9. $\frac{1}{2} + \frac{1}{16} = \frac{?}{16} + \frac{1}{16} = \frac{?}{16}$ | |
| 6. $\frac{1}{16} + \frac{1}{16} = \frac{?}{16} = \frac{?}{8}$ | | 10. $\frac{3}{8} + \frac{1}{2} = \frac{?}{8}$ | |
| 7. $\frac{5}{16} + \frac{1}{16} = \frac{?}{16} = \frac{?}{4}$ | | 11. $\frac{15}{16} + \frac{1}{16} = \frac{?}{16} = ?$ | |

12. When you added $\frac{1}{4}$ and $\frac{5}{8}$, you thought, " $\frac{1}{4}$ is $\frac{?}{8}$; $\frac{2}{8} + \frac{5}{8}$ is $\frac{?}{8}$." You did that because fractions can never be added unless they have the same denominator. So before you can add fractions, you need to learn how to change fractions so that their denominators are alike without changing the value of the fractions.

Changing Fractions

We do not always have a drawing to look at to help us change one fraction into another. Let us see if we can find a way to change halves to fourths, eighths, sixteenths, etc., without a drawing to help us.

We have
learned that

$$(1) \frac{1}{2} = \frac{2}{4}$$

$$(2) \frac{1}{2} = \frac{4}{8}$$

Notice
that

$$\frac{1 \times 2}{2 \times 2} = \frac{2}{4}$$

$$\frac{1 \times 4}{2 \times 4} = \frac{4}{8}$$

We have
learned that

$$(3) \frac{3}{4} = \frac{6}{8}$$

$$(4) \frac{2}{4} = \frac{8}{16}$$

Notice
that

$$\frac{3 \times 2}{4 \times 2} = \frac{6}{8}$$

$$\frac{2 \times 4}{4 \times 4} = \frac{8}{16}$$

This shows us an easy way to change one fraction to another.

We can change one fraction to another by multiplying both numerator and denominator by the same number.

1. Let us change $\frac{3}{8}$ to 16ths.

$$\frac{3}{8} = \frac{?}{16}$$

(1) First we think : We must multiply 8 by 2 to get

16. ($8 \times 2 = 16$.)

$$\frac{3}{8 \times 2} = \frac{?}{16}$$

(2) Then we must multiply 3 by the same number ; that is, 2. ($3 \times 2 = 6$)

(3) This shows that $\frac{3}{8} = \frac{6}{16}$.

$$\frac{3 \times 2}{8 \times 2} = \frac{6}{16}$$

Look at the drawing on page 38 and see if $\frac{3}{8} = \frac{6}{16}$.

2. Let us change $\frac{3}{4}$ to 16ths.

$$\frac{3}{4} = \frac{?}{16}$$

Think : $4 \times ? = 16$. ($4 \times 4 = 16$)

Then think : $4 \times 3 = 12$.

$$\frac{3 \times 4}{4 \times 4} = \frac{12}{16}$$

So 12 is the new numerator.

3. $\frac{3}{5} = \frac{?}{20}$ (5 was multiplied by 4 to make 20; so the 3 must be multiplied by ____, too.)

4. $\frac{5}{6} = \frac{?}{12}$ (What was the 6 multiplied by to make 12? By what must the 5 be multiplied?)

Changing Fractions

Give the numerators in these examples:

- | | | | |
|---------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 1. $\frac{1}{2} = \frac{?}{4}$ | 7. $\frac{1}{3} = \frac{?}{6}$ | 13. $\frac{1}{6} = \frac{?}{12}$ | 19. $\frac{4}{5} = \frac{?}{10}$ |
| 2. $\frac{1}{2} = \frac{?}{8}$ | 8. $\frac{1}{3} = \frac{?}{12}$ | 14. $\frac{3}{4} = \frac{?}{8}$ | 20. $\frac{1}{6} = \frac{?}{12}$ |
| 3. $\frac{1}{2} = \frac{?}{10}$ | 9. $\frac{1}{4} = \frac{?}{8}$ | 15. $\frac{2}{3} = \frac{?}{12}$ | 21. $\frac{5}{6} = \frac{?}{12}$ |
| 4. $\frac{1}{2} = \frac{?}{12}$ | 10. $\frac{1}{4} = \frac{?}{12}$ | 16. $\frac{3}{4} = \frac{?}{16}$ | 22. $\frac{5}{8} = \frac{?}{16}$ |
| 5. $\frac{1}{2} = \frac{?}{14}$ | 11. $\frac{1}{4} = \frac{?}{16}$ | 17. $\frac{2}{5} = \frac{?}{10}$ | 23. $\frac{2}{3} = \frac{?}{6}$ |
| 6. $\frac{1}{2} = \frac{?}{16}$ | 12. $\frac{1}{5} = \frac{?}{10}$ | 18. $\frac{3}{5} = \frac{?}{10}$ | 24. $\frac{7}{8} = \frac{?}{16}$ |

Tell whether the following statements are true or false:

- | | | |
|---|--|---|
| 25. $\frac{1}{5} = \frac{2}{10}$ | 27. $\frac{1}{6}$ of \$1.50 = \$25 | 29. $6 \times \$1.50 = \90 |
| 26. $125\text{¢} = \$1.25$ | 28. $\frac{3}{5} = \frac{6}{15}$ | 30. $\frac{3}{8} = \frac{6}{16}$ |
| 31. 25 dimes = \$2.50 | 33. $\$10.00 - \$5.49 = \$5.51$ | |
| 32. $\$1.75 + \$2.89 = \$4.64$ | 34. $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$ | |
| 35. $\frac{3}{8} = \frac{6}{16}$ | 39. $\frac{3}{4} + \frac{1}{4} = \frac{4}{4}$ | 43. $\frac{1}{3} + \frac{1}{3} = \frac{2}{6}$ |
| 36. $\frac{1}{8} + \frac{3}{8} = \frac{4}{8} = \frac{1}{2}$ | 40. $\frac{3}{4} = \frac{6}{8}$ | 44. $\frac{2}{3} = \frac{8}{12}$ |
| 37. $\frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1$ | 41. $\frac{5}{8} + \frac{1}{8} = \frac{7}{8}$ | 45. $\frac{1}{6} + \frac{1}{6} = \frac{2}{6}$ |
| 38. $\frac{2}{3} = \frac{2}{6}$ | 42. $\frac{5}{8} = \frac{10}{16}$ | 46. $\frac{5}{6} = \frac{7}{12}$ |
| 47. 40 nickels = \$1.00 | 48. $\frac{3}{10} + \frac{2}{10} = \frac{6}{10}$ | |

Complete these examples:

49. To find $\frac{3}{8}$ of 16, think: $\frac{1}{8}$ of 16 is 2, $\frac{3}{8}$ of 16 is 3×2 , or ____.
- | | | |
|---------------------------------|---------------------------------|---------------------------------|
| 50. $\frac{1}{5}$ of 10 = ____. | 53. $\frac{1}{4}$ of 24 = ____. | 56. $\frac{1}{3}$ of 27 = ____. |
| $\frac{2}{5}$ of 10 = ____. | $\frac{3}{4}$ of 24 = ____. | $\frac{2}{3}$ of 27 = ____. |
| 51. $\frac{1}{4}$ of 16 = ____. | 54. $\frac{1}{5}$ of 30 = ____. | 57. $\frac{1}{3}$ of 36 = ____. |
| $\frac{3}{4}$ of 16 = ____. | $\frac{4}{5}$ of 30 = ____. | $\frac{2}{3}$ of 36 = ____. |
| 52. $\frac{1}{8}$ of 24 = ____. | 55. $\frac{1}{8}$ of 40 = ____. | 58. $\frac{1}{6}$ of 42 = ____. |
| $\frac{7}{8}$ of 24 = ____. | $\frac{5}{8}$ of 40 = ____. | $\frac{5}{6}$ of 42 = ____. |

Adding Fractions

Harry had three boards, one $\frac{1}{2}$ in. thick, one $\frac{1}{4}$ in., and one $\frac{1}{8}$ in. thick. He wanted to nail these three boards together with some nails that would just reach through the boards. He wondered how thick the three boards together would be.

He thought: $\frac{1}{2} = \frac{4}{8}$; $\frac{1}{4} = \frac{2}{8}$; so $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} = \frac{4}{8} + \frac{2}{8} + \frac{1}{8} = \frac{4+2+1}{8} = \frac{7}{8}$.

The three boards together will be $\frac{7}{8}$ in. thick.

(1) Add $\frac{1}{2}$ and $\frac{1}{6}$. Think: $\frac{1}{2} = \frac{3}{6}$; $\frac{3}{6} + \frac{1}{6} = \frac{3+1}{6} = \frac{?}{6}$.

This is a good way to write the example: $\longrightarrow$

1	=	3
2	=	6
1	=	1
6	=	6
		4
		6

(2) Add $\frac{1}{2}$ and $\frac{1}{8}$. Think: $\frac{1}{2} = \frac{4}{8}$; $\frac{4}{8} + \frac{1}{8} = \frac{4+1}{8} = \frac{?}{8}$.

This is a good way to write the example: $\longrightarrow$

1	=	4
2	=	8
1	=	1
8	=	8
		5
		8

Tell how the fractions in each of these examples must be changed before they can be added. Then copy, change, and add.

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>
1.	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{1}{10}$	$\frac{1}{6}$
	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{10}$	$\frac{1}{2}$

2.	$\frac{1}{5}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{4}$	$\frac{7}{12}$	$\frac{3}{10}$	$\frac{1}{6}$
	$\frac{1}{10}$	$\frac{5}{12}$	$\frac{2}{3}$	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{1}{5}$	$\frac{1}{3}$
	$\frac{3}{5}$	$\frac{1}{3}$	$\frac{1}{12}$	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{1}{10}$	$\frac{1}{2}$

3.	$\frac{1}{12}$	$\frac{1}{8}$	$\frac{1}{10}$	$\frac{1}{12}$	$\frac{1}{16}$	$\frac{1}{12}$	$\frac{1}{8}$
	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{1}{4}$
	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{12}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$

Adding Fractions

Mary's teacher asked her to add $\frac{2}{3}$ and $\frac{1}{6}$. Mary thought: " $\frac{2}{3} = \frac{4}{6}$; $\frac{4}{6} + \frac{1}{6} = \frac{5}{12}$." Do you see that Mary made a very bad mistake? What was it?

Be sure that you never make the same kind of mistake that Mary did.

If you tell what words belong in these blank spaces, it will help you to remember that *when you add or subtract fractions, the denominators are not added or subtracted.*

- (1) $\begin{cases} 3 \text{ books} + 4 \text{ books} = 7 \text{ ____} \\ 3 \text{ ninths} + 4 \text{ ninths} = 7 \text{ ____} \end{cases}$
- (2) $\begin{cases} 5 \text{ pencils} + 6 \text{ pencils} = 11 \text{ ____} \\ 5 \text{ twelfths} + 6 \text{ twelfths} = 11 \text{ ____} \end{cases}$
- (3) $\begin{cases} 5 \text{ apples} + 4 \text{ apples} = 9 \text{ ____} \\ 5 \text{ tenths} + 4 \text{ tenths} = 9 \text{ ____} \end{cases}$
- (4) $\begin{cases} 3 \text{ dolls} + 2 \text{ dolls} = 5 \text{ ____} \\ 3 \text{ eighths} + 2 \text{ eighths} = 5 \text{ ____} \end{cases}$

Add these fractions as quickly as you can:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>
1.	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{3}{8}$	$\frac{5}{6}$	$\frac{2}{3}$	$\frac{5}{8}$	$\frac{1}{9}$	$\frac{3}{8}$
	$\frac{1}{4}$	$\frac{1}{12}$	$\frac{1}{16}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{3}{16}$	$\frac{2}{3}$	$\frac{7}{8}$
	$\frac{1}{4}$	$\frac{1}{12}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{1}{12}$	$\frac{3}{4}$	$\frac{2}{9}$	$\frac{1}{4}$

In each of these pairs of fractions, tell which is the larger fraction. (HINT. It is easy to tell which is the larger fraction if you change them to fractions that have the same denominators.)

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
2.	$\frac{1}{4}, \frac{1}{2}$	$\frac{3}{4}, \frac{7}{8}$	$\frac{1}{3}, \frac{1}{2}$	$\frac{3}{8}, \frac{1}{4}$	$\frac{1}{8}, \frac{1}{4}$
3.	$\frac{3}{16}, \frac{1}{4}$	$\frac{1}{2}, \frac{5}{8}$	$\frac{2}{5}, \frac{3}{10}$	$\frac{1}{12}, \frac{1}{6}$	$\frac{7}{12}, \frac{1}{2}$
4.	$\frac{1}{6}, \frac{1}{3}$	$\frac{5}{8}, \frac{3}{4}$	$\frac{2}{3}, \frac{5}{6}$	$\frac{1}{4}, \frac{1}{6}$	$\frac{5}{12}, \frac{1}{4}$
5.	$\frac{3}{4}, \frac{5}{6}$	$\frac{3}{8}, \frac{1}{2}$	$\frac{3}{5}, \frac{1}{2}$	$\frac{2}{3}, \frac{3}{4}$	$\frac{3}{8}, \frac{5}{16}$

Subtracting Fractions



1. Mrs. Cook left $\frac{3}{4}$ of a cake on the kitchen table. Bobby came home from school, hungry as usual, and Mrs. Cook told him to help himself to some cake. When Mrs. Cook went to the kitchen, there was only $\frac{3}{8}$ of a cake on the table. How much of the cake had Bobby eaten?

$$\begin{array}{r} \frac{3}{4} = \frac{6}{8} \\ \frac{3}{8} = \frac{3}{8} \\ \hline \frac{3}{8} \end{array}$$

$$\frac{3}{4} = \frac{?}{8}; \quad \frac{6}{8} - \frac{3}{8} = \frac{6-3}{8} = \frac{?}{8}.$$

2. Alice has $\frac{1}{2}$ yd. of ribbon. If she uses $\frac{1}{8}$ yd. for a doll's hair ribbon, how much will she have left?

HINT. $\frac{1}{2} = \frac{?}{8}; \quad \frac{4}{8} - \frac{1}{8} = \frac{4-1}{8} = \frac{?}{8}.$

3. Jean asked her mother for some goods to make her doll a dress. Her mother said, "There is a piece of goods on the sewing machine. I need $\frac{1}{2}$ yd. of it for a dust cap. If there is more than that there, you may have the extra piece for your doll."

Jean measured the piece of goods with a yardstick that was marked off in quarters. It was $\frac{3}{4}$ yd. long. If Jean saves the $\frac{1}{2}$ yd. for her mother, how much may she cut off for the doll dress?

HINT. $\frac{1}{2} = \frac{?}{4}; \quad \frac{3}{4} - \frac{2}{4} = \frac{?}{4}.$

Do you see that when you want to subtract fractions, it is necessary for the fractions to have the same denominator just as it was when you added fractions? (See Ex. (1) to (4), page 42.)

Do these subtractions:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>
4.	$\frac{3}{8}$	$\frac{5}{6}$	$\frac{7}{8}$	$\frac{9}{10}$	$\frac{5}{8}$	$\frac{7}{10}$	$\frac{5}{8}$	$\frac{5}{9}$	$\frac{5}{12}$
	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{16}$	$\frac{1}{3}$	$\frac{1}{3}$
5.	$\frac{7}{12}$	$\frac{9}{16}$	$\frac{7}{16}$	$\frac{11}{12}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{5}{6}$	$\frac{5}{6}$	$\frac{5}{8}$
	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{5}{8}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{4}$

Zeros in Division

Sometimes zeros cause trouble in division. Can you explain these three examples?

$$\begin{array}{r} 203 \\ 25 \overline{)5075} \\ \underline{50} \\ 75 \\ \underline{75} \\ 0 \end{array}$$

$$\begin{array}{r} 204 \\ 56 \overline{)11424} \\ \underline{112} \\ 224 \\ \underline{224} \\ 0 \end{array}$$

$$\begin{array}{r} 400 \text{ } r14 \\ 51 \overline{)20414} \\ \underline{204} \\ 14 \end{array}$$

When you do these division examples, remember this: In a long division example, the last figure of the quotient is always directly above the last figure of the dividend.

$$(1) \quad 26 \overline{)5226} \quad 35 \overline{)70070} \quad 41 \overline{)12382} \quad 62 \overline{)12462} \quad 67 \overline{)134205}$$

$$(2) \quad 34 \overline{)6936} \quad 46 \overline{)18630} \quad 54 \overline{)32836} \quad 63 \overline{)19225} \quad 62 \overline{)124248}$$

$$(3) \quad 32 \overline{)3264} \quad 42 \overline{)84126} \quad 53 \overline{)10605} \quad 72 \overline{)29019} \quad 81 \overline{)162081}$$

$$(4) \quad 49 \overline{)9947} \quad 25 \overline{)15128} \quad 36 \overline{)21814} \quad 28 \overline{)14128} \quad 49 \overline{)343343}$$

DIVISION TEST I

$$1. \quad 75 \overline{)2800} \quad 2. \quad 37 \overline{)15133} \quad 3. \quad 50 \overline{)1971} \quad 4. \quad 75 \overline{)4513}$$

$$5. \quad 38 \overline{)19266} \quad 6. \quad 95 \overline{)38760} \quad 7. \quad 79 \overline{)47716}$$

DIVISION TEST II

$$1. \quad 27 \overline{)81059} \quad 2. \quad 36 \overline{)36109} \quad 3. \quad 24 \overline{)96072} \quad 4. \quad 23 \overline{)96289}$$

$$5. \quad 97 \overline{)97779} \quad 6. \quad 85 \overline{)85085} \quad 7. \quad 49 \overline{)98196}$$

Problems.

1. During the month of July, James earned \$22.94 selling papers. Did he earn as much as a dollar a day? He earned an average of ____ cents each day.

2. Dick has earned \$16.50 the first 12 working days in June. At the same average daily earnings, how much can he earn during the whole month, not counting 4 Sundays?

Beware of the Zeros! *

Some fifth-grade children have difficulty with zeros. Be sure you can do every example on this page correctly before going on.

ZEROS IN SUBTRACTION

- | | | | |
|--|--|--|--|
| 1. $\begin{array}{r} 286 \\ 176 \\ \hline \end{array}$ | 2. $\begin{array}{r} 284 \\ 175 \\ \hline \end{array}$ | 3. $\begin{array}{r} 560 \\ 386 \\ \hline \end{array}$ | 4. $\begin{array}{r} 906 \\ 784 \\ \hline \end{array}$ |
| 5. $\begin{array}{r} 867 \\ 504 \\ \hline \end{array}$ | 6. $\begin{array}{r} 679 \\ 560 \\ \hline \end{array}$ | 7. $\begin{array}{r} 500 \\ 289 \\ \hline \end{array}$ | 8. $\begin{array}{r} 2000 \\ 1864 \\ \hline \end{array}$ |

ZEROS IN MULTIPLICATION

- | | | | |
|---|--|---|--|
| 1. $\begin{array}{r} 280 \\ 27 \\ \hline \end{array}$ | 2. $\begin{array}{r} 506 \\ 84 \\ \hline \end{array}$ | 3. $\begin{array}{r} 800 \\ 725 \\ \hline \end{array}$ | 4. $\begin{array}{r} 783 \\ 208 \\ \hline \end{array}$ |
| 5. $\begin{array}{r} 864 \\ 20 \\ \hline \end{array}$ | 6. $\begin{array}{r} 289 \\ 500 \\ \hline \end{array}$ | 7. $\begin{array}{r} 863 \\ 4000 \\ \hline \end{array}$ | 8. $10 \times 56 =$
9. $100 \times 56 =$ |

ZEROS IN DIVISION

- | | | | |
|-------------------------|--------------------------|---------------------------|---------------------------|
| 1. $7 \overline{)1421}$ | 2. $8 \overline{)165}$ | 3. $9 \overline{)36018}$ | 4. $8 \overline{)2407}$ |
| 5. $21 \overline{)426}$ | 6. $21 \overline{)4263}$ | 7. $35 \overline{)70070}$ | 8. $35 \overline{)10503}$ |

READING AND WRITING ZEROS IN NUMBERS

Read in words:

- | | | |
|--------------|--------------|----------------|
| 1. 1,000,000 | 5. 100,000 | 9. 10,010,010 |
| 2. 1,100,001 | 6. 1,010,000 | 10. 10,100,010 |
| 3. 1,100,010 | 7. 1,100,100 | 11. 10,000,001 |
| 4. 1,110,000 | 8. 1,001,001 | 12. 10,010,100 |

13. Ask your teacher to dictate some other numbers containing zeros, to see if you can write them.

Three Tests

TEST I

1. Add \$375.80, \$463.90, \$275.65, and \$68.08.
2. Subtract \$254.84 from \$300.00.
3. At \$2.75 each what is the cost of 15 Boy Scout flash lights?
4. If eggs are selling for \$.60 a dozen, how much did the egg I ate for breakfast cost?

5. Give the missing numerators: $\frac{?}{2} = \frac{?}{4} = \frac{?}{6} = \frac{?}{8} = \frac{?}{10} = \frac{?}{12} = \frac{?}{16}$.

6. $\frac{1}{2} + \frac{3}{10} = ?$ 7. $\frac{3}{6} + \frac{5}{12} + \frac{1}{2} = ?$ 8. $\frac{1}{4} + \frac{3}{8} + \frac{5}{16} = ?$

TEST II

Work and check each of these examples:

- | | | | |
|---|---------------------------|--|--------------------------|
| 1. 650
478
96
3
25
876
<u>543</u> | 2. $8540 - 6735 =$ | 5. $\begin{array}{r} 509 \\ \times 35 \\ \hline \end{array}$ | 8. $\frac{1}{8}$ of 40 = |
| 3. $75 \times 93 =$ | 6. $75 \overline{)15075}$ | 9. $\frac{3}{8}$ of 40 = | |
| 4. $69 \overline{)5073}$ | 7. $42 \overline{)1145}$ | 10. $\frac{5}{8}$ of 40 = | |

11. Harold has \$2.80. How many 25-cent pictures can he buy?

TEST III

Tell how these blank spaces should be filled in:

1. In the fraction $\frac{4}{5}$, 4 is the ____ and 5 is the ____.
2. To change the form of a fraction without changing its value we may multiply both its ____ and its ____ by the ____ number.
3. Four fifths equals ____ tenths.
4. The answer in a multiplication example is called the ____.
5. The answer in a division example is called the ____.
6. Fractions must have the same ____ before they are added.
7. The number that is 16 less than 75 is ____.
8. ____ is 19 less than 84.

Progress Test No. 2

Write just the answers to these examples on your paper.
Number each answer. (Record your score.)

1. *Add:*

279
386
549
875
903
432

2. *Subtract:*

4000
3897

3. *Multiply:*

576
437

4. Find the quotient when 45,657 is the dividend and 57 is the divisor.

5. In the fraction $\frac{5}{8}$, 5 is the ____ and 8 is the ____.

6. Two dozen boxes of raspberries at 18¢ a box will cost ____¢.

7. If a pack of two dozen envelopes costs 50¢, the envelopes cost a little more than ____ cents apiece.

8. $\frac{1}{4}$ of 368 =

12. $\frac{5}{8} + \frac{1}{8} =$

16. $\frac{3}{4} + \frac{1}{8} =$

9. $\frac{1}{8}$ of 656 =

13. $\frac{1}{4} + \frac{3}{8} =$

17. $\frac{7}{8} - \frac{1}{4} =$

10. $\frac{2}{3} = \frac{?}{6}$

14. $\frac{3}{4} = \frac{?}{12}$

18. $\frac{2}{3} - \frac{1}{6} =$

11. $\frac{4}{5} = \frac{?}{10}$

15. $\frac{3}{8} = \frac{?}{16}$

19. $\frac{1}{4} + \frac{1}{8} =$

Add:

20. $\frac{7}{12}$
 $\frac{1}{6}$
 $\frac{1}{6}$

21. $\frac{1}{12}$
 $\frac{1}{2}$
 $\frac{1}{4}$

22. $\frac{1}{16}$
 $\frac{3}{8}$
 $\frac{1}{4}$

Subtract:

23. $\frac{5}{12}$
 $\frac{1}{3}$

24. $\frac{5}{8}$
 $\frac{1}{4}$

25. $\frac{7}{8}$
 $\frac{1}{2}$

Standards: X, 23. Y, 19. Z, 13.

Finding Out What You Know and What You Don't Know

If you fail any of the examples on this page, look on page 49 to find out where to get the practice you need.

TEST I. ADDITION

- | | | | | |
|----------|-----------|--------|-------------|---|
| 1. 6 | 2. 38 | 3. 805 | 4. \$5.87 | 5. $\frac{1}{4} + \frac{2}{4} =$ |
| 8 | 55 | 906 | 6.95 | |
| 5 | 67 | 879 | 4.32 | 6. $\frac{3}{8} + \frac{1}{4} =$ |
| 6 | 95 | 854 | .76 | |
| 7 | <u>84</u> | | <u>9.79</u> | 7. $\frac{7}{12} + \frac{1}{6} + \frac{1}{6} =$ |
| 8 | | | | |
| <u>9</u> | | | | |

8. Find the sum of \$375.86, \$295.43, \$87.87, and \$952.67.

TEST II. SUBTRACTION

- | | | | | |
|-----------|-----------|------------|-------------|---------------|
| 1. 86 | 2. 95 | 3. 407 | 4. 5000 | 5. \$375.25 |
| <u>23</u> | <u>26</u> | <u>398</u> | <u>2976</u> | <u>298.76</u> |

6. From \$865.32 take \$267.98.

7. From $\frac{3}{8}$ take $\frac{1}{4}$.

8. From $\frac{9}{12}$ take $\frac{2}{3}$.

TEST III. MULTIPLICATION

- | | | | | | |
|----------|-----------|-----------|------------|------------|------------|
| 1. 77 | 2. 75 | 3. 546 | 4. 675 | 5. 507 | 6. 254 |
| <u>5</u> | <u>89</u> | <u>87</u> | <u>329</u> | <u>324</u> | <u>309</u> |
7. 256
400

TEST IV. DIVISION

- | | | |
|--------------------------|---------------------------|---------------------------|
| 1. 8) $\overline{6456}$ | 3. 51) $\overline{20425}$ | 5. 32) $\overline{96289}$ |
| 2. 91) $\overline{3915}$ | 4. 75) $\overline{4515}$ | 6. 18) $\overline{1432}$ |

7. At 15¢ each how many pictures can you buy for \$1.80?

8. If 15 pictures cost \$1.80, how much does each picture cost?

The Practice You Need

If you failed any of the examples on page 48, the following chart will tell you where to find the practice you need. If you failed Example 1, Test I, the chart tells you to practice page 8, Examples 1 to 8. Where does the chart tell you to practice if you failed Example 2 of Test I?

TEST I	TEST II	TEST III	TEST IV
1. p. 8 Exs. 1-8	1. p. 12 Test I	1. p. 17 Test I	1. p. 23 A Short Division Test
2. p. 8 Exs. 9-15	2. p. 12 Test II	2. p. 17 Test II	2. p. 22 A Divi- sion Test
3. p. 8 Exs. 16-17	3. p. 12 Test III	3. p. 17 Test III	3-5. p. 44
4. p. 10, Test V Exs. 1-5	4. p. 12 Test IV	4. p. 17 Test IV	6. p. 23 A Long Division Test
5. p. 41 Ex. 1	5-6. p. 12 Test V	5-7. p. 17 Test V	7-8. p. 31
6. p. 41 Ex. 1	7-8. p. 43 Exs. 4-5		
7. p. 41 Exs. 2-3			
8. p. 28 Exs. 14-18			

Just for Fun

11	4	9
6	8	10
7	12	5

1. Here is a magic square. Do you see that the sum of the numbers in each column is 24, and the sum of the numbers in each row and in each diagonal is 24?

Would you like

to try adding the columns, rows, and diagonals of this square to see if it is a magic square? —————→

2. *Art*: Can you write eleven thousand, eleven hundred eleven?"

Jack: "Sure. That's easy. Here it is: 11,111."

Art: You are wrong! [Was he?]

30	39	48	1	10	19	28
38	47	7	9	18	27	29
46	6	8	17	26	35	37
5	14	16	25	34	36	45
13	15	24	33	42	44	4
21	23	32	41	43	3	12
22	31	40	49	2	11	20

CHAPTER III

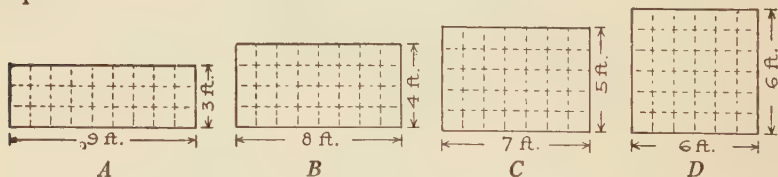
MEASUREMENT

Areas

Donald's father gave him 24 ft. of wire netting with which to make a yard for his chicks. Donald wants to make the largest yard that he can make, in the form of a rectangle.

A rectangle is a figure with four sides and four square corners.

(1) The four figures below are all rectangles. They have square corners.



(2) At first Donald thought he would make his yard like Figure A, 3 ft. wide and 9 ft. long. Can he make one that size with the 24 ft. of wire netting? Would there be any wire left over?

(3) Do you know how many square feet there would be in a yard 3 ft. wide and 9 ft. long? If you do not know, you may count the small blocks in yard A to find out.

Each of the small blocks is 1 ft. long and 1 ft. wide. A square 1 ft. wide and 1 ft. long is called a square foot.

(4) Donald's brother said, "If you make your yard 4 ft. wide and 8 ft. long, it will be larger than if you make it 3 ft. wide and 9 ft. long." Was he right?

(5) Can Donald make a yard 4 ft. wide and 8 ft. long with 24 ft. of wire netting?

Areas

(6) Donald's chum said, "Why don't you make the yard 5 ft. wide and 7 ft. long?" (See Figure C.) Can Donald make a yard of that size with 24 ft. of wire?

(7) How many square feet are there in a yard 5 ft. wide and 7 ft. long? Is that larger than yards *A* and *B*?

(8) Donald's father said, "If I were doing it, I'd make a yard that is a square, 6 ft. wide and 6 ft. long." Has Donald enough wire to make a yard of that size? How many square feet would there be in that yard?

(9) Which is the largest of all the yards suggested?

(10) If Donald made his yard 10 ft. long, how wide could he make it, using the 24 ft. of wire? Would the yard then be larger or smaller than the yard shown at *A*? at *B*? *C*? *D*?

Do you see that you can find the number of square feet in a rectangle by multiplying the number of feet in its length by the number of feet in its width?

The length and the width of a rectangle are called its dimensions.

1. What are the dimensions of rectangle *A*? of *B*? *C*? *D*?

A square is a rectangle whose dimensions are equal.

The distance around any figure is called its perimeter.

2. What is the perimeter of rectangle *A*? of *B*? *C*? *D*?

3. Can two rectangles have the same perimeter and not be the same size?

4. I happen to know that the perimeter of a certain square is 12 inches. How can I find the length of each side of the square without measuring?

5. What facts about a rectangle would you need to know in order to find its area?

Drawing Rectangles

(1) Draw on your paper a rectangle 2 in. wide and 3 in. long. Use the corner of a sheet of paper to help you draw the corners of the rectangle. How many square inches are there in it?

Remember that a square inch is 1 in. long and 1 in. wide.

To find the number of square inches in a rectangle, multiply the number of inches in its length by the number of inches in its width.

(2) Draw a rectangle 2 in. wide and 4 in. long. How many square inches does it contain?

(3) Draw a rectangle 3 in. wide and 4 in. long. How many square inches does it contain?

(4) Draw on the blackboard a square 1 ft. wide and 1 ft. long. It is a square foot.

How many inches wide and how many inches long is it? How many square inches does it contain?

$$144 \text{ sq. in.} = 1 \text{ sq. ft.}$$

(5) Draw a rectangle 6 in. wide and 24 in. long. How many square inches does it contain? Could you cut it in two pieces and fit them together to make a square 1 ft. wide and 1 ft. long?

(6) Draw on the board a square 1 yd. wide and 1 yd. long. It is a square yard. How many feet long and how many feet wide is it? How many square feet does it contain?

$$9 \text{ sq. ft.} = 1 \text{ sq. yd.}$$

When you find the number of square inches, square feet, or square yards in a figure, you are finding its *area*.

(7) What is the area represented by Figure A on page 50? by B? C? D?

(8) How many square inches are there in a rectangle whose area is 3 sq. ft.?

Areas

What is the area of a rectangle that is

- | | |
|----------------------------|-----------------------------|
| 1. 4 in. wide, 5 in. long? | 6. 7 ft. wide, 9 ft. long? |
| 2. 6 ft. wide, 7 ft. long? | 7. 8 yd. wide, 5 yd. long? |
| 3. 3 yd. wide, 8 yd. long? | 8. 8 ft. wide, 9 ft. long? |
| 4. 6 ft. wide, 9 ft. long? | 9. 4 in. wide, 8 in. long? |
| 5. 6 in. wide, 8 in. long? | 10. 7 mi. long, 7 mi. wide? |

There are several short ways of reading and writing the dimensions (length and width) of a rectangle. Instead of saying that the rectangle in Example 2 above is 6 ft. wide and 7 ft. long, we could say it is 6 ft. by 7 ft. It could be written 6 ft. $\times$ 7 ft. 6 ft. $\times$ 7 ft. is read, "6 feet by 7 feet."

Seven feet is sometimes written 7'. Seven inches is written 7".

11. If a rectangle is 6' by 8', it is 6 ____ wide and 8 ____ long.

12. A rectangle 8" $\times$ 9" is 8 ____ wide and 9 ____ long.

Give in words the dimensions of these rectangles.

13. 9' $\times$ 6' 14. 8" $\times$ 6" 15. 7" $\times$ 5" 16. 6' $\times$ 4' 17. 10' $\times$ 9'

To find the area of a rectangle, you must express its width and length in the same units. That means that if the length is expressed in inches, the width must be expressed in inches also; if the length is expressed in feet, the width must be expressed in feet also; if the length is expressed in yards, the width must be expressed in yards also.

18. Find the areas of these rectangles. (Be careful.)

(a) 2' $\times$ 9" (b) 8" $\times$ 3' (c) 2 ft. $\times$ 3 yd.

19. Which is larger, a rectangle 9' $\times$ 6" or a square whose side is 2' long?

20. The area of a blotter is 18 sq. in. Its width is 3 in. What is its length?

Laying a Floor

Grace's father is having hardwood floors put down in the living room and the dining room of their home. The carpenter who is doing the work said he would charge 50¢ a square yard.

1. The living room in Grace's home is $18' \times 20'$. How many square feet of floor space are there in the living room?

2. The dining room is $18' \times 18'$. How many square feet of floor space are there in the dining room?

3. Since 360 sq. ft. of hardwood floor are going to be laid in the living room and 324 sq. ft. in the dining room, how many square feet of hardwood floor are going to be laid all together?

4. Did the carpenter tell how much he would charge to lay a square foot of flooring? What did he say?

5. Are there more or fewer square yards than square feet in the floor?

6. How many square feet equal 1 sq. yd.? 684 sq. ft. is how many square yards?

7. Find how much Grace's father will have to pay to have the 684 sq. ft. of hardwood floors laid.

8. The carpenter is going to varnish the bedroom floors for 10¢ a square yard. The front bedroom is $15' \times 18'$. How much will it cost to have that varnished?

9. The middle bedroom is $14' \times 18'$. How much will it cost to have that varnished?

10. The back bedroom is $9' \times 16'$. How much will it cost to have that varnished?

Tell what numbers belong in these blank spaces:

- | | |
|-------------------------------|--------------------------------|
| 11. 18 sq. ft. = ____ sq. yd. | 14. 27 sq. ft. = ____ sq. yd. |
| 12. 2 sq. ft. = ____ sq. in. | 15. 432 sq. in. = ____ sq. ft. |
| 13. 5 sq. yd. = ____ sq. ft. | 16. 8 sq. ft. = ____ sq. in. |

Areas

1. A rectangle $9' \times 16'$ contains ____ sq. ft., or ____ sq. yd.
2. A rectangle $15' \times 18'$ contains ____ sq. ft., or ____ sq. yd.
3. A rectangle $5 \text{ yd.} \times 6 \text{ yd.}$ contains ____ sq. yd., or ____ sq. ft.
4. A rectangle $7 \text{ yd.} \times 9 \text{ yd.}$ contains ____ sq. yd., or ____ sq. ft.
5. A rectangle $3' \times 4'$ contains ____ sq. ft., or ____ sq. in.
6. A rectangle $12'' \times 24''$ contains ____ sq. in., or ____ sq. ft.

Find in square feet the areas of the following rectangles :

7. 9 yd. by 5 yd.
9. $72'' \times 36''$
8. $36'' \times 24''$
10. 18 yd. by 5 ft.

(HINT. Did you change yards to feet before multiplying in Example 10? Why?)

Find in square yards the areas of the following rectangles :

11. $18' \times 23'$
13. $32' \times 36'$
12. $24' \times 27'$
14. 3 yd. by 18 ft.

Tell whether these statements are true or false :

15. The area of a rectangle $9' \times 12''$ is 108 sq. in.
16. The area of a rectangle is one of the dimensions of the rectangle.
17. The area of a rectangle $9' \times 12'$ is 12 sq. yd.
18. The area of a rectangle $9 \text{ yd.} \times 12 \text{ yd.}$ is 972 sq. ft.
19. 144 sq. in. is the same area as 1 sq. ft.
20. The length of a rectangle plus the width of the rectangle is the perimeter of the rectangle.
21. In any rectangle there are more square inches than there are square feet.
22. A rectangle $9' \times 4'$ is larger than a square $6' \times 6'$.

Recalling What You Know about Fractions

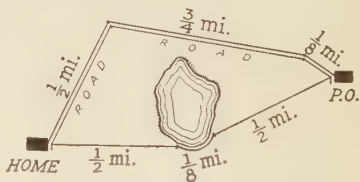
Give the missing numerators in Examples 1 to 8:

- | | | | |
|---|--|---|---|
| 1. $\frac{1}{4} = \frac{?}{8}$ | 3. $\frac{1}{3} = \frac{?}{12}$ | 5. $\frac{3}{4} = \frac{?}{12}$ | 7. $\frac{2}{3} = \frac{?}{15}$ |
| 2. $\frac{1}{2} = \frac{?}{6}$ | 4. $\frac{3}{8} = \frac{?}{16}$ | 6. $\frac{1}{2} = \frac{?}{10}$ | 8. $\frac{5}{8} = \frac{?}{16}$ |
| 9. $\frac{1}{2}$
<u>+ $\frac{1}{4}$</u> | 10. $\frac{1}{6}$
<u>+ $\frac{1}{3}$</u> | 11. $\frac{3}{5}$
<u>- $\frac{3}{10}$</u> | 12. $\frac{5}{12}$
<u>+ $\frac{1}{2}$</u> |
| | | | 13. $\frac{7}{8}$
<u>- $\frac{3}{16}$</u> |
| | | | 14. $\frac{3}{8}$
<u>+ $\frac{1}{4}$</u> |

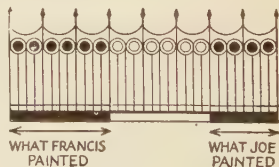
15. $\frac{7}{12} + \frac{1}{3} =$ 17. $\frac{1}{8} + \frac{1}{4} + \frac{1}{2} =$ 19. $\frac{5}{12} + \frac{2}{3} + \frac{1}{2} =$
 16. $\frac{1}{8} + \frac{3}{8} + \frac{1}{4} =$ 18. $\frac{1}{12} + \frac{1}{4} + \frac{1}{3} =$ 20. $\frac{2}{5} + \frac{1}{2} + \frac{2}{10} =$

21. The dimensions of a little rectangle are $\frac{1}{8}$ " and $\frac{1}{4}$ ". What is its perimeter?

22. One day a stranger stopped in front of John's home and asked the distance to the post office. John drew this little map for the stranger and told him that the distance by way of the road was ____ miles, but that across the fields and around the pond it was only ____ miles.



23. Joe and Francis live next door to each other. They are painting the wire fence between their yards. They started at opposite ends of the fence. What part of the fence has Joe painted? What part has Francis painted? What part have both painted? What part remains to be painted?



24. Mrs. Keller asked for $\frac{3}{4}$ lb. of cheese. The grocer cut it and said, "Will this be too much? It is 14 oz." Mrs. Keller said, "Well, it is ____ oz. more than I wanted, but I'll take it." The cheese was 32¢ a lb. How much more did she have to pay for the cheese than she would have paid if she had got $\frac{3}{4}$ lb.?

Easy Oral Work

Do not use pencils to work any of these examples:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
1. $63 \overline{)252}$	$78 \overline{)390}$	$85 \overline{)765}$	$95 \overline{)760}$	$49 \overline{)392}$
2. $\begin{array}{r} 87 \\ - 75 \\ \hline \end{array}$	$\begin{array}{r} 104 \\ - 89 \\ \hline \end{array}$	$\begin{array}{r} 275 \\ - 164 \\ \hline \end{array}$	$\begin{array}{r} 549 \\ - 78 \\ \hline \end{array}$	$\begin{array}{r} 654 \\ - 403 \\ \hline \end{array}$
3. $\begin{array}{r} 63 \\ \times 5 \\ \hline \end{array}$	$\begin{array}{r} 80 \\ \times 8 \\ \hline \end{array}$	$\begin{array}{r} 79 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 68 \\ \times 9 \\ \hline \end{array}$	$\begin{array}{r} 507 \\ \times 7 \\ \hline \end{array}$
4. $\begin{array}{r} 65 \\ + 85 \\ \hline \end{array}$	$\begin{array}{r} 168 \\ + 251 \\ \hline \end{array}$	$\begin{array}{r} 247 \\ + 353 \\ \hline \end{array}$	$\begin{array}{r} \frac{1}{4} \\ + \frac{3}{8} \\ \hline \end{array}$	$\begin{array}{r} \frac{3}{5} \\ + \frac{1}{10} \\ \hline \end{array}$

5. What are the areas of rectangles with the following dimensions? (a) $2'' \times 2''$; (b) $9' \times 13'$; (c) 8 yd. by 7 yd.

6. There are ____ square feet in one square yard.

7. There are ____ square inches in one square foot.

8. To find the number of square yards in 72 sq. ft. you must ____ the 72 by ____.

9. There are ____ sq. in. in 5 sq. ft.

10. If a half-dozen oranges cost 30¢, how much does each orange cost?

11. Find the cost of 125 2-cent stamps.

12. At 5¢ each how many pencils can you buy with \$2.00?

13. Tell what you would say and what coins you would give in change from a 5-dollar bill after a \$2.43 purchase.

14. Which is larger, $\frac{5}{8}$ or $\frac{3}{4}$?

15. Which is smaller, $\frac{1}{5}$ or $\frac{2}{10}$?

Learning How to Share

(1) If three cookies are shared by two children, each child may take $\frac{1}{2}$ of the first cookie, $\frac{1}{2}$ of the second cookie, and $\frac{1}{2}$ of the third cookie. All together each child will get $\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$ or $\frac{3}{2}$ of a cookie.



(2) The two children may share the three cookies like this: Each child may take a whole cookie, and then the remaining cookie may be divided equally between them. Then each child would get one cookie and one half a cookie, or, as we say, one and one-half cookies. This is written $1\frac{1}{2}$ cookies.



(3) The first way that the children shared the cookies, each child got $\frac{3}{2}$ of a cookie.

(4) The second way that the children shared the cookies, each child got $1\frac{1}{2}$ cookies.

(5) Is three halves of a cookie the same amount as one and one-half cookies?

$$1. \quad \frac{5}{3} = \frac{3}{3} + \frac{2}{3} = 1\frac{2}{3}$$

$$2. \quad \frac{7}{2} = 3\frac{1}{2}$$

Fractions like $\frac{3}{2}$, $\frac{5}{3}$, and $\frac{7}{2}$ are called *improper fractions*.

Numbers like $1\frac{1}{2}$, $1\frac{2}{3}$, $3\frac{1}{2}$ are called *mixed numbers*. Why do you suppose they are called mixed numbers?

3. If 5 wafers are shared by 4 children, each child may take $\frac{1}{4}$ of the first wafer, $\frac{1}{4}$ of the second, $\frac{1}{4}$ of the third, $\frac{1}{4}$ of the fourth, and $\frac{1}{4}$ of the fifth wafer. How many fourths will each child get? In what other way could the children share the wafers?

Improper Fractions and Mixed Numbers

Do you see the difference between proper fractions and improper fractions?

*A fraction whose numerator is smaller than the denominator is called a **proper fraction**.*

*A fraction whose numerator is equal to or larger than the denominator is called an **improper fraction**.*

*A **mixed number** is made up of a whole number and a fraction.*

Tell whether the following are proper fractions, improper fractions, or mixed numbers :

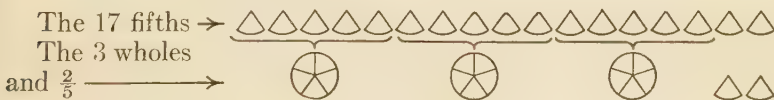
- | | | | | | | |
|--------------------|-------------------|------------------|--------------------|--------------------|--------------------|--------------------|
| 1. $1\frac{1}{8}$ | 4. $\frac{7}{8}$ | 7. $\frac{9}{8}$ | 10. $6\frac{4}{5}$ | 13. $\frac{12}{7}$ | 16. $1\frac{8}{9}$ | 19. $\frac{14}{5}$ |
| 2. $\frac{15}{16}$ | 5. $\frac{16}{9}$ | 8. $\frac{5}{6}$ | 11. $4\frac{5}{6}$ | 14. $\frac{27}{3}$ | 17. $\frac{17}{5}$ | 20. $\frac{19}{4}$ |
| 3. $2\frac{7}{8}$ | 6. $\frac{2}{3}$ | 9. $\frac{3}{3}$ | 12. $\frac{21}{5}$ | 15. $3\frac{4}{5}$ | 18. $\frac{24}{6}$ | 21. $\frac{19}{2}$ |

We saw on page 58 that $\frac{5}{3} = 1\frac{2}{3}$. We know also that $\frac{5}{3}$ means 5 divided by 3. Divide 5 by 3. Is your answer $1\frac{2}{3}$?

We saw also that $\frac{7}{2} = 3\frac{1}{2}$. Divide 7 by 2. Is your answer $3\frac{1}{2}$? This shows us an easy way to change an improper fraction to a mixed number.

Improper fractions may be changed to mixed numbers or whole numbers by dividing the numerator by the denominator.

To change $\frac{17}{5}$ to a mixed number think: $17 \div 5 = 3\frac{2}{5}$. Do you see why we divide 17 by 5? We are really seeing how many times 5 is contained in 17.



22. Change all the improper fractions in Examples 1 to 21 above into mixed numbers or whole numbers.

Using Mixed Numbers

1. Mrs. Kline bought 2 heads of cabbage. One head weighed $\frac{3}{4}$ lb. and the other head weighed $\frac{7}{8}$ lb. Both heads together weighed $\frac{7}{8}$ lb. ($\frac{13}{8}$ lb. = $1\frac{5}{8}$ lb.)

Add the fractions below. (If your answer is an improper fraction, change it to a mixed number.)

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>
2. $\frac{3}{4}$	$\frac{5}{8}$	$\frac{2}{3}$	$\frac{5}{6}$	$\frac{5}{12}$	$\frac{3}{8}$	$\frac{7}{8}$
$\frac{1}{8}$	$\frac{3}{16}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{3}{16}$
3. $\frac{1}{4}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{12}$	$\frac{1}{8}$	$\frac{5}{12}$	$\frac{3}{8}$
$\frac{1}{2}$	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
$\frac{1}{8}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$

4. These two garden plots each contain one acre. Can you tell what part of an acre each one of the children is farming?

5. Bob, Herman, and Mary have planted their gardens in corn. That means that _____ acres have been planted in corn.

<i>Bob</i>	
<i>Mary</i>	<i>Jean</i>
<i>Tom</i>	<i>Bill</i>

6. Tom and Jack made watermelon beds out of theirs; so there is _____ of an acre planted in watermelons.

<i>Jack</i>	<i>Merrill</i>
<i>Herman</i>	

7. The others planted potatoes; so there is _____ of an acre planted in potatoes.

8. Mr. Stoner owns $\frac{3}{8}$ of an acre of land. His neighbor has offered to sell him $\frac{3}{4}$ of an acre more. If he buys it, how much land will he have all together?

9. If land is worth \$120 an acre, how much would Mr. Stoner have to pay his neighbor for the piece he wants to buy?

The Bargain Sale

1. At a bargain sale Mrs. Smith bought a $\frac{3}{4}$ -yd. piece of gingham and a $\frac{3}{8}$ -yd. piece. How much gingham did she buy all together? (Express your answer as a mixed number.)

2. She also bought a $1\frac{3}{8}$ -yd. piece of silk and a $\frac{1}{4}$ -yd. piece. How much silk did she buy all together?

$$\begin{array}{r} 1\frac{3}{8} = 1\frac{3}{8} \\ \frac{1}{4} = \frac{2}{8} \\ \hline 1\frac{5}{8} \end{array}$$

3. Add: *a.* $1\frac{1}{8}$ *b.* $2\frac{3}{6}$ *c.* $4\frac{1}{10}$ *d.* $\frac{1}{12}$ *e.* $\frac{1}{6}$ *f.* $\frac{1}{8}$

$$\begin{array}{r} \frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{3} \\ \hline \end{array} \quad \begin{array}{r} \frac{2}{5} \\ \hline \end{array} \quad \begin{array}{r} 2\frac{2}{3} \\ \hline \end{array} \quad \begin{array}{r} 3\frac{2}{3} \\ \hline \end{array} \quad \begin{array}{r} 5\frac{3}{4} \\ \hline \end{array}$$

4. Mrs. Carr bought a $2\frac{3}{4}$ -yd. piece of linen and a $\frac{1}{2}$ -yd. piece. How much did she buy all together?

$$\begin{array}{r} 2\frac{3}{4} = 2\frac{3}{4} \\ \frac{1}{2} = \frac{2}{4} \\ \hline 2\frac{5}{4} \end{array}$$

($\frac{3}{4}$ yd. and $\frac{1}{2}$ yd. is $\frac{5}{4}$ yd., or one and $\frac{1}{4}$ yd.; 2 yd. and $1\frac{1}{4}$ yd. are $3\frac{1}{4}$ yd.)

But

$$\begin{array}{r} \frac{5}{4} = 1\frac{1}{4} \\ 2 + 1\frac{1}{4} = 3\frac{1}{4} \\ \text{So } 2\frac{5}{4} = 3\frac{1}{4} \end{array}$$

5. Add: *a.* $1\frac{7}{8}$ *b.* $2\frac{5}{6}$ *c.* $4\frac{9}{10}$ *d.* $\frac{7}{12}$ *e.* $\frac{5}{6}$ *f.* $5\frac{5}{6}$

$$\begin{array}{r} \frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{3} \\ \hline \end{array} \quad \begin{array}{r} \frac{2}{5} \\ \hline \end{array} \quad \begin{array}{r} 3\frac{2}{3} \\ \hline \end{array} \quad \begin{array}{r} 4\frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} 5\frac{5}{6} \\ \hline \end{array}$$

6. Mrs. Carr also bought a $1\frac{5}{8}$ -yd. piece of cretonne and a $1\frac{1}{2}$ -yd. piece. How much cretonne did she buy all together?

$$\begin{array}{r} 1\frac{5}{8} = 1\frac{5}{8} \\ 1\frac{1}{2} = 1\frac{4}{8} \\ \hline 2\frac{9}{8} \end{array}$$

But

$$\begin{array}{r} \frac{9}{8} = 1\frac{1}{8} \\ 2 + 1\frac{1}{8} = 3\frac{1}{8} \end{array}$$

7. What is the sum of $3\frac{7}{10}$ and $2\frac{4}{5}$?

8. Add: *a.* $2\frac{7}{8}$ *b.* $2\frac{5}{6}$ *c.* $2\frac{9}{10}$ *d.* $3\frac{5}{12}$ *e.* $8\frac{5}{6}$ *f.* $6\frac{5}{8}$

$$\begin{array}{r} 1\frac{3}{4} \\ \hline \end{array} \quad \begin{array}{r} 3\frac{2}{3} \\ \hline \end{array} \quad \begin{array}{r} 5\frac{4}{5} \\ \hline \end{array} \quad \begin{array}{r} 4\frac{2}{3} \\ \hline \end{array} \quad \begin{array}{r} 5\frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} 3\frac{3}{8} \\ \hline \end{array}$$

9. Mrs. Jones bought a $2\frac{7}{8}$ -yd. piece of lace and a $1\frac{1}{2}$ -yd. piece. How much lace did she buy?

Adding Mixed Numbers

We have learned that in adding mixed numbers we should

- (1) Find the sum of the fractions;
- (2) Find the sum of the whole numbers;
- (3) If the sum of the fractions is an improper fraction, change it to a mixed number;
- (4) Add the mixed number to the sum of the whole numbers of the example.

There are only two mistakes in the addition examples below. See if you can find them.

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $\begin{array}{r} 1\frac{5}{8} \\ 2\frac{1}{8} \\ \hline 3\frac{6}{8} \end{array}$	$\begin{array}{r} 3\frac{1}{8} = 3\frac{1}{8} \\ 2\frac{1}{4} = 2\frac{2}{8} \\ \hline 5\frac{3}{8} \end{array}$	$\begin{array}{r} 3\frac{1}{6} = 3\frac{1}{6} \\ 2\frac{2}{3} = 2\frac{4}{6} \\ \hline 5\frac{5}{6} \end{array}$	$\begin{array}{r} 2\frac{7}{8} = 2\frac{7}{8} \\ 1\frac{1}{4} = 1\frac{2}{8} \\ \hline 3\frac{8}{8} = 3\frac{1}{8} \end{array}$
2. $\begin{array}{r} 6\frac{3}{4} \\ 5\frac{1}{4} \\ \hline 11\frac{4}{4} = 12 \end{array}$	$\begin{array}{r} 7\frac{7}{8} \\ 5\frac{1}{8} \\ \hline 12\frac{8}{8} = 13 \end{array}$	$\begin{array}{r} 7\frac{3}{5} \\ 5\frac{2}{5} \\ \hline 12\frac{5}{5} = 13 \end{array}$	$\begin{array}{r} 6\frac{3}{4} = 6\frac{6}{8} \\ 5\frac{3}{8} = 5\frac{3}{8} \\ \hline 11\frac{9}{8} = 11\frac{1}{8} \end{array}$

Find the sums:

3. $\begin{array}{r} 2\frac{3}{4} \\ \frac{1}{8} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{3}{8} \\ 2\frac{1}{8} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{5}{8} \\ 2\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{3}{4} \\ 2\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{5}{6} \\ 3\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 2\frac{3}{4} \\ 4\frac{7}{8} \\ \hline \end{array}$
4. $\begin{array}{r} 3\frac{1}{2} \\ 3\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{2}{3} \\ 6\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 2\frac{1}{4} \\ 5\frac{7}{8} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{7}{8} \\ 3\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{5}{12} \\ 3\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{5}{12} \\ 2\frac{2}{3} \\ \hline \end{array}$
5. $\begin{array}{r} 2\frac{1}{2} \\ 4\frac{7}{10} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{3}{8} \\ 4\frac{7}{8} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{7}{12} \\ 4\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 2\frac{9}{16} \\ 3\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{1}{6} \\ 9\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 2\frac{5}{8} \\ \frac{3}{4} \\ \hline \end{array}$
6. $\begin{array}{r} 7\frac{2}{3} \\ 8\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{5}{8} \\ 3\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{1}{5} \\ 9\frac{3}{5} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{3}{5} \\ \frac{9}{10} \\ \hline \end{array}$	$\begin{array}{r} \frac{1}{4} \\ 2\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 8\frac{7}{8} \\ \hline \end{array}$

Addition and Subtraction of Mixed Numbers

1. Mrs. Ball bought two chickens for the Christmas dinner. One chicken weighed $3\frac{1}{2}$ lb. The other weighed $2\frac{3}{4}$ lb. All together she bought ____ lb. of chicken.

2. She wanted $3\frac{1}{2}$ lb. of white grapes for her fruit basket. She had a large bunch that weighed $1\frac{1}{4}$ lb.; so she had to buy ____ lb. more.

To find the answer to this problem you must ____ $1\frac{1}{4}$ from ____.
(HINT. Subtract the fractions first and then the whole numbers.)

3. Mrs. Burns wants to make an apron that requires $2\frac{1}{8}$ yd. of gingham. If she cuts this from a piece containing $4\frac{3}{4}$ yd. of gingham, she will have ____ yd. of gingham left. Will she have enough left to make a dress for her little girl if the pattern she wants to use calls for $2\frac{1}{2}$ yd. of material?

Add:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>
4. $1\frac{3}{4}$	$5\frac{3}{5}$	$3\frac{5}{8}$	$6\frac{3}{4}$	$3\frac{5}{6}$	$2\frac{3}{4}$
$2\frac{1}{3}$	$4\frac{3}{5}$	$2\frac{1}{2}$	$7\frac{1}{4}$	$2\frac{1}{3}$	$1\frac{5}{8}$

5. $3\frac{1}{2}$	$5\frac{2}{3}$	$2\frac{1}{4}$	$5\frac{7}{9}$	$4\frac{5}{12}$	$3\frac{2}{3}$
$2\frac{3}{4}$	$1\frac{2}{3}$	$3\frac{7}{8}$	$2\frac{1}{3}$	$2\frac{5}{6}$	$2\frac{1}{3}$

Subtract:

6. $3\frac{3}{4}$	$4\frac{5}{8}$	$6\frac{5}{6}$	$7\frac{7}{8}$	$8\frac{5}{6}$	$2\frac{3}{5}$
$1\frac{1}{2}$	$3\frac{1}{8}$	$2\frac{1}{3}$	$3\frac{1}{4}$	4	$1\frac{1}{10}$

7. $4\frac{5}{6}$	$5\frac{1}{2}$	$6\frac{5}{9}$	$8\frac{3}{10}$	$3\frac{1}{2}$	$4\frac{5}{6}$
$2\frac{1}{3}$	$3\frac{1}{8}$	$2\frac{1}{3}$	$2\frac{1}{5}$	$2\frac{1}{4}$	$1\frac{1}{6}$

Four Short Tests

TEST I. (4 minutes)

- | | | | |
|----------|-----------------------------------|--|-------------------------|
| 1. 6 | 2. $1\frac{7}{8}$ | 3. 409 | 4. $75\overline{)2410}$ |
| 7 | $+ 3\frac{3}{4}$ | $\times 75$ | 5. 3007 |
| 5 | | | <u>— 2543</u> |
| 8 | 6. $\frac{7}{10}$ | 7. (a) Find the area of a rectangle 4 ft. by | |
| <u>9</u> | <u>$— \frac{1}{2}$</u> | 8 ft. (b) Find the perimeter. | |

TEST II. (4 minutes)

- | | | | |
|---|------------------------------------|-----------------------------------|-------|
| 1. 86784 | 2. 605 | 3. $83\overline{)41583}$ | 4. 27 |
| <u>— 30509</u> | <u>$\times 739$</u> | | 65 |
| | | | 84 |
| | | | 70 |
| | | | 99 |
| 5. How much would you have left from \$10.00 after buying a dozen towels at 65¢ each? | | | 67 |
| 6. $\frac{7}{8}$ | 7. $2\frac{5}{8}$ | 8. $\frac{5}{16}$ | |
| <u>$+ \frac{1}{4}$</u> | <u>$+ 1\frac{1}{3}$</u> | <u>$— \frac{1}{4}$</u> | |

TEST III. (4 minutes)

- | | | |
|--|--|------------|
| 1. 248 | 2. Take 8090 from 19000. | 4. 275 |
| <u>$\times 24000$</u> | | 392 |
| | 3. Divide 56084 by 28. | 776 |
| 5. Add $4\frac{3}{5}$ to $2\frac{7}{10}$. | 6. Subtract $\frac{1}{2}$ from $\frac{5}{6}$. | 59 |
| | | <u>987</u> |

7. At 15¢ each how many Christmas-tree light bulbs can you buy for \$2.00? Will there be any money left over?

TEST IV. (4 minutes)

- | | | | | | |
|-------------|--|--------------------------------|-----------------------------------|------------------------------------|------------------------------------|
| 1. \$31.79 | 2. 125463 | 3. 460 | 4. $\frac{7}{8}$ | 5. $8\frac{7}{8}$ | 6. $\frac{5}{6}$ |
| 29.98 | <u>— 98754</u> | <u>$\times 208$</u> | <u>$— \frac{1}{2}$</u> | <u>$+ 2\frac{1}{8}$</u> | <u>$— \frac{1}{12}$</u> |
| 94.75 | | | | | |
| 37.69 | 7. There are ____ sq. in. in a square foot and | | | | |
| <u>9.84</u> | ____ sq. ft. in a square yard. | | | | |

Measurements

When you are measuring length, you sometimes measure in inches. Can you name four other units of measure you might use in measuring length? Do you know this table of length?

12 inches	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
$16\frac{1}{2}$ feet	= 1 rod (rd.)
5280 feet	= 1 mile (mi.)
320 rods	= 1 mile (mi.)

When you measure the area of a surface, you sometimes measure it in square inches. From the table below can you tell five other units of measure you might use in measuring a surface?

144 sq. in.	= 1 square foot (sq. ft.)
9 sq. ft.	= 1 square yard (sq. yd.)
160 sq. rd.	= 1 acre (A.)
640 acres	= 1 square mile (sq. mi.)

1. Ask your teacher to let you measure off a rod along one side of your playground. About how many rods long is your playground? About how many rods wide?

2. Measure off a square each of whose sides is a rod long. The area of that square is one square _____. There are _____ square rods in an acre.

3. I saw these signs while on an automobile trip. Can you name some objects that are these distances from your school?

RAILROAD CROSSING
200 FEET AHEAD

Hot Dogs
50 Feet Ahead

→ GAS →
200 YARDS

! SLOW DOWN!
CROSS X ROAD
100 FT. AHEAD

Just one mile more
to GROVER'S
AUTO REPAIR SHOP

$\frac{1}{2}$ MILE TO
CHICKEN DINNER
AT MACK'S

Estimating Lengths and Areas *

1. Estimate the length of this page. Estimate its width. Using the estimated dimensions, tell its estimated area. Measure to see how nearly right you were.

2. Estimate the length of your desk top ; the width ; the area. Measure to see how nearly correct you were in your estimates.

3. Estimate the length of your teacher's desk ; the width ; the area. Measure to check your estimates.

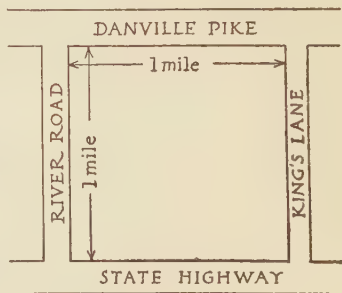
4. Estimate the height of a window in your schoolroom ; the width ; the area. Measure to check your estimates.

5. Estimate the length, width, and area of the floor of your schoolroom. Check your estimates by measuring.

6. Estimate the length, width, and area of your playground. Check your estimates by measuring.

7. Make some suggestions to your teacher of vacant lots, fields, etc., the areas of which you would like to estimate. Let some of the pupils measure to check your estimates.

8. How far is it from River Road to King's Lane? from the State Highway to Danville Pike? What is the area of the land bounded by the four roads?



9. Do you know any four roads or streets that enclose a square mile as the four roads shown in the picture do?

10. Are there any towns or cities that are about 2 miles from your home town? Name them. Name any that are about 5 miles from your home town; 10 miles; 15 miles; 25 miles. Can you name any place that is about 100 miles from where you live?

Scale Drawings

1. In this diagram of my garden, one-fourth inch stands for a foot in the garden. How many fourths of an inch long is the picture? That means that my garden is ____ ft. long.

2. How many fourths of an inch wide is the diagram of my garden? That means that my garden is ____ ft. wide.

3. How wide is my potato patch? my tomato patch? my cabbage patch?

POTATOES
TOMATOES
CABBAGES

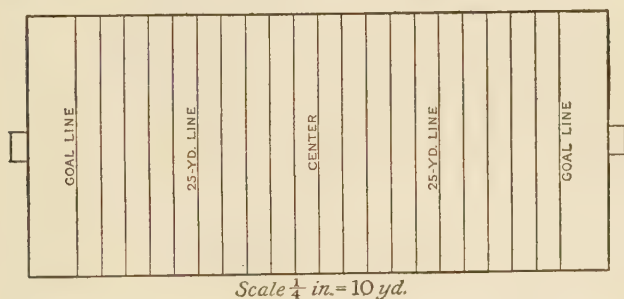
4. Make a drawing of an $8' \times 12'$ garden, letting $\frac{1}{4}"$ on your picture stand for 1 ft. of the garden.

5. Make a drawing of a $16' \times 24'$ garden, letting $\frac{1}{8}"$ on your picture stand for 1 ft. of the garden.

When you make a drawing, letting an inch or a fraction of an inch on the drawing stand for a longer distance on the object you are representing, we say you are *drawing to scale*.

6. Why do you think drawings are drawn to scale? (Does it make them the same shape as the thing they picture?)

7. We wanted to lay out a football field in our playground.



From this diagram which we found in a magazine we decided the field should be ____ yd. long and about ____ yd. wide.

Scale Drawings *

1. Why are geography maps drawn to scale?
2. What country are you studying about in geography now? Find the map of that country and tell what scale was used in drawing it.
3. Find the distances between various cities in the country you are studying.
4. Using a scale of $\frac{1}{2}''$ to a yard, draw a line which represents 1 yd.; 2 yd.; 3 yd.; 4 yd.; 5 yd.
5. Using a scale of $\frac{1}{4}''$ to a mile, draw a line which represents 1 mi.; 2 mi.; 3 mi.; 4 mi.; 8 mi.
6. Using a scale of $\frac{3}{4}''$ to a mile, draw a line which represents 1 mi.; 2 mi.; 3 mi.; $\frac{1}{2}$ mi.

True-False Test

Tell whether each of these sentences is true or false:

1. A rectangle $8'' \times 9''$ contains 72 sq. ft.
2. Square yards can be changed to square feet by multiplying by 9.
3. The number of square inches a rectangle contains is larger than the number of square feet it contains.
4. The perimeter of a rectangle $8'' \times 9''$ is 17 in.
5. The area of a rectangle equals the length plus the width.
6. A rectangle 7 mi. by 9 mi. has an area of 63 miles.
7. An acre is 160 times as large as a square rod.
8. Square inches can be changed to square feet by dividing by 144.
9. Using a scale $\frac{1}{2}$ in. to 1 yd., this line _____ stands for 2 yd.
10. Using a scale $\frac{1}{2}$ in. to 10 ft., this line _____ stands for 5 ft.
11. A rug $9' \times 4'$ is larger than a rug $6' \times 6'$.
12. There are 5280 ft. in a mile.

Finding Correct Quotient Figures

$$\boxed{27 \overline{)189}}$$

Is 9 the correct quotient figure in this example? Try 8. Is that correct? Try 7. Is that correct?

Here is a rule that is very helpful in finding quotient figures: *Try the quotient figure which seems right. If it is too large, try the next smaller number. If that is too large, try the next smaller number. If that is too large, keep going down one at a time until you find one that you can use.*

Be careful to choose the correct quotient figures in these examples:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
1.	$27 \overline{)1429}$	$39 \overline{)1446}$	$19 \overline{)586}$	$25 \overline{)1426}$	$16 \overline{)560}$
2.	$16 \overline{)645}$	$36 \overline{)564}$	$28 \overline{)1463}$	$57 \overline{)3875}$	$48 \overline{)3607}$
3.	$37 \overline{)2773}$	$26 \overline{)1857}$	$59 \overline{)3585}$	$49 \overline{)2814}$	$15 \overline{)7734}$
4.	$39 \overline{)1446}$	$28 \overline{)1598}$	$16 \overline{)8437}$	$29 \overline{)1875}$	$36 \overline{)2051}$
5.	$34 \overline{)2684}$	$86 \overline{)6293}$	$28 \overline{)1985}$	$78 \overline{)6135}$	$29 \overline{)1874}$
6.	$54 \overline{)4873}$	$48 \overline{)3495}$	$17 \overline{)6938}$	$77 \overline{)6453}$	$26 \overline{)1859}$

Do these examples orally:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
7.	$\frac{1}{5}$ of 25 =	$\frac{2}{5}$ of 25 =	$\frac{3}{5}$ of 25 =	$\frac{4}{5}$ of 25 =
8.	$\frac{1}{8}$ of 32 =	$\frac{3}{8}$ of 32 =	$\frac{5}{8}$ of 32 =	$\frac{7}{8}$ of 32 =
9.	$\frac{1}{9}$ of 45 =	$\frac{2}{9}$ of 45 =	$\frac{5}{9}$ of 45 =	$\frac{8}{9}$ of 45 =
10.	$\frac{5}{6}$ of 30 =	$\frac{7}{8}$ of 56 =	$\frac{2}{3}$ of 24 =	$\frac{3}{4}$ of 24 =
11.	$\frac{1}{2}$ of 32 =	$\frac{5}{8}$ of 72 =	$\frac{1}{3}$ of 42 =	$\frac{2}{7}$ of 49 =
12.	$\frac{3}{5}$ of 40 =	$\frac{5}{9}$ of 54 =	$\frac{4}{5}$ of 50 =	$\frac{7}{8}$ of 48 =

Review Exercises

1.
$$\begin{array}{r} 705 \\ \times 403 \\ \hline \end{array}$$

2. 67×473

3.
$$\begin{array}{r} 5000 \\ - 4760 \\ \hline \end{array}$$

4. $56 \overline{)11256}$

5. $3304 \div 59 =$

6. $7560 - 2798 =$

7. $640 \times 573 =$

8. Add 5476, 2798, 4980, 7597, and 4693.

9. $75 \overline{)4800}$

10. $5785 \div 89 =$

11.
$$\begin{array}{r} 406 \\ \times 309 \\ \hline \end{array}$$

12.
$$\begin{array}{r} 78543 \\ - 20069 \\ \hline \end{array}$$

Can you find two mistakes in these four examples?

13.

$$\begin{array}{r} 23 \\ 145 \overline{)3335} \\ \underline{290} \\ 435 \\ \underline{435} \end{array}$$

14.

$$\begin{array}{r} 49 \\ 507 \overline{)24843} \\ \underline{2028} \\ 4563 \\ \underline{4563} \end{array}$$

15.

$$\begin{array}{r} 41 \text{ r } 40 \\ 275 \overline{)11325} \\ \underline{1100} \\ 325 \\ \underline{275} \\ 40 \end{array}$$

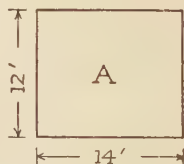
16.

$$\begin{array}{r} 5 \text{ r } 50 \\ 270 \overline{)13550} \\ \underline{1350} \\ 50 \end{array}$$

17. Find the area of rectangle A.

18. Find the perimeter of rectangle A.

19. Mr. Jones owes the following amounts of money: \$24.75, \$29.80, \$7.63, \$48.00. He has \$115.07 in his bank account. How much will he have left after he pays these bills?



20. When I was in the toyshop this morning, the owner received 3 dozen sleds. He marked each one \$4.75. Do you know how much money he will get for them if he sells them all?

21. How many square inches are there in a table top $36'' \times 20''$? How many square feet?

22. How much will a farm 40 rd. wide and 84 rd. long cost at \$125 an acre?

23.
$$\begin{array}{r} 2\frac{1}{4} \\ + 3\frac{7}{8} \\ \hline \end{array}$$

24.
$$\begin{array}{r} 5\frac{3}{8} \\ - 2\frac{1}{8} \\ \hline \end{array}$$

25.
$$\begin{array}{r} 5\frac{7}{10} \\ + 2\frac{1}{2} \\ \hline \end{array}$$

26.
$$\begin{array}{r} 5\frac{7}{10} \\ - 2\frac{1}{2} \\ \hline \end{array}$$

Problem Study

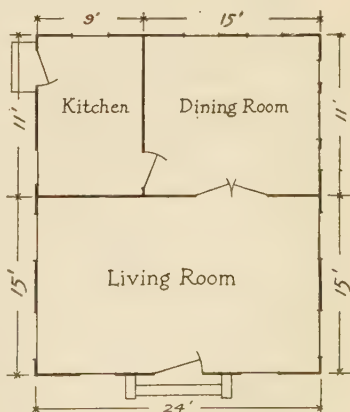
Do the problems on this page. If you miss Problem 1, go to page (72) and do 1 (a), 1 (b), 1 (c), and 1 (d). Then come back and see if you can do Problem 1 on this page correctly. If you fail Problem 2 on this page, practice 2 (a), 2 (b), and 2 (c) on page 72. Then try Problem 2 on this page again, and so on through the other problems.

1. A grocer bought 500 lb. of sugar for \$32.00. He sold 300 lb. of it for 8¢ a pound, and then sold the rest at a sale for $7\frac{1}{2}$ ¢ a pound. How much did he gain on the sugar? That is, how much more did he get for it than it cost him?

2. The same grocer bought a crate containing 32 boxes of strawberries for \$4.80. He sold them at the rate of 4 boxes for a dollar. How much did he gain on the berries?

3. Mrs. Meyers bought 25 lb. of the sugar at $7\frac{1}{2}$ ¢ a pound and 16 boxes of the strawberries. How much change did she get if she paid for them with a 10-dollar bill?

4. This is a plan of the first floor of Mr. Jones's new home. He is figuring out how much it is going to cost to finish the floors. He must pay 3¢ a square foot to have the dining-room and living-room floors stained. The linoleum he wants to lay in the kitchen costs \$1.80 a square yard, and he must pay \$5.00 to have it put down. Can you tell how much the three floors will cost all together?



Study Helps

Pupils who do the problems on page 71 correctly the first time they try them, need not do the problems on this page.

1. (a) The grocer bought a crate containing 150 oranges for \$6.20. He sold 6 dozen oranges at 60¢ a dozen. How much money did he get for those? (b) How many oranges are 6 dozen oranges? How many oranges had he left after he sold the 6 dozen? He sold those left at 4¢ apiece. How much did he get for them? (c) How much did he get all together for the oranges he sold? (d) How much more did he get for the oranges than he paid for them?

2. (a) A grocer bought 24 cakes at 25¢ a dozen. How much did he pay for them? (b) He sold them at the rate of 2 for 5¢. In 24 cakes there are ____ groups of 2 cakes. Since he got 5¢ for each group of 2 cakes, for ____ groups of 2 cakes he got ____ times ____ cents, or ____ cents. (c) How much more did he get for the cakes than he paid for them?

3. (a) At $12\frac{1}{2}$ ¢ each 2 cantaloupes will cost ____; 3 cantaloupes will cost _____. (b) Pineapples are selling at 2 for a quarter. 6 of them will cost as many quarters as there are 2's in 6, which is _____. This is ____ cents. (c) The 3 cantaloupes and the pineapples will both cost _____. (d) If you pay for them with a 2-dollar bill, you will get ____ change.

4. (a) How many square feet are there in a floor $9' \times 12'$? (b) At 5¢ a square foot how much will it cost to finish the floor mentioned in (a)? (c) How many square feet are there in a floor $9' \times 15'$? How many square yards? (d) At 50¢ a square yard find the cost of finishing the floor mentioned in (c). (e) Find the total cost of finishing the floors mentioned above.

Finding Averages

1. I had 9 arithmetic examples correct on Monday, 10 correct on Tuesday, and 8 correct on Wednesday. In the three days I had 27 examples correct. That is the same as though I had ____ examples correct on each of the three days. I can say that my daily average was 9 examples correct.

2. If I had 8 examples correct on Monday, 12 on Tuesday, and 10 on Wednesday, I had a daily average of ____ examples correct.

3. My arithmetic mark for Monday was 90, Tuesday 85, Wednesday 80, Thursday 95, and Friday 90. My average for the week was ____.

4. During this last week our meat bill was \$5.40; our milk bill was \$1.75; our grocery bill was \$6.00. Our average daily meat bill was ____; our average daily milk bill was ____; our average daily grocery bill was ____.

My teacher asked me to help her find the averages of the marks of some of the children in our room. I've written the answers I got at the bottom of the columns. Do you agree with my answers?

	MARY C.	ROBERT D.	GEORGE F.	SARA H.	BETTY M.	ALICE R.	BILL R.	TED S.	JACK T.	EARL W.	JENNIE Y.
Reading . .	90	80	70	80	70	80	65	80	90	85	75
Arithmetic . .	88	75	65	85	70	70	60	90	95	80	80
Spelling . .	90	75	70	80	75	85	70	85	95	85	80
Social Studies.	85	75	65	85	70	75	70	90	90	60	68
Drawing . .	80		80		90			95	88	70	75
Music . . .				80				80	88		
Phys. Training	80	85	75				70	85	90	85	90
Average . .	$85\frac{1}{2}$	78	$70\frac{5}{6}$	82	75	$77\frac{1}{2}$	67	$86\frac{3}{7}$	$90\frac{6}{7}$	$77\frac{1}{2}$	$76\frac{1}{3}$

An Oral Review

Complete these statements:

- | | |
|--|--|
| <p>1. 1 sq. ft. = ____ sq. in.</p> <p>2. $\frac{1}{2}$ sq. ft. = ____ sq. in.</p> <p>3. 2 sq. ft. = ____ sq. in.</p> <p>4. 1 sq. yd. = ____ sq. ft.</p> <p>5. $\frac{1}{3}$ sq. yd. = ____ sq. ft.</p> <p>6. 27 sq. ft. = ____ sq. yd.</p> <p>7. 54 sq. ft. = ____ sq. yd.</p> <p>8. $1\frac{1}{2}$ sq. ft. = ____ sq. in.</p> <p>9. $\frac{1}{4}$ ft. = ____ in.</p> <p>10. $\frac{1}{6}$ ft. = ____ in.</p> | <p>11. $\frac{5}{6}$ ft. = ____ in.</p> <p>12. $\frac{1}{2}$ acre = ____ sq. rd.</p> <p>13. $\frac{1}{2}$ mi. = ____ ft.</p> <p>14. $\frac{1}{2}$ sq. mi. = ____ A.</p> <p>15. $\frac{9}{8} = ?$</p> <p>16. $\frac{1^2}{5} = ?$</p> <p>17. $\frac{1}{3} + \frac{1}{6} = ?$</p> <p>18. $\frac{1}{2} + \frac{1}{8} = ?$</p> <p>19. $\frac{1}{2} - \frac{1}{10} = ?$</p> <p>20. $\frac{3}{8} - \frac{1}{4} = ?$</p> |
|--|--|

$$\begin{array}{r} 21. \quad 16 \\ \quad 27 \\ \quad 39 \\ \quad \underline{5} \end{array}$$

$$\begin{array}{r} 22. \quad 17 \\ \quad 12 \\ \quad 54 \\ \quad \underline{12} \end{array}$$

$$\begin{array}{r} 23. \quad 754 \\ \quad \underline{- 62} \end{array}$$

$$\begin{array}{r} 24. \quad 897 \\ \quad \underline{- 128} \end{array}$$

25. Multiply 607 by 9.

26. Divide 7361 by 9; by 8; by 7; by 6; by 5.

27. Using the scale $\frac{1}{2}$ in. to 10 mi., tell the distances which these lines stand for:

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
----------	----------	----------	----------

Give the whole-number part of the quotient in each of the following examples:

a	b	c	d	e
28. $40\overline{)207}$	$30\overline{)216}$	$20\overline{)98}$	$21\overline{)197}$	$29\overline{)197}$
29. $38\overline{)156}$	$42\overline{)257}$	$56\overline{)389}$	$79\overline{)276}$	$84\overline{)675}$
30. $99\overline{)876}$	$87\overline{)635}$	$79\overline{)624}$	$65\overline{)479}$	$58\overline{)442}$
31. $47\overline{)385}$	$39\overline{)276}$	$47\overline{)358}$	$59\overline{)275}$	$67\overline{)384}$

A Written Test

$$\begin{array}{r} 1. \quad 125786 \\ - 38974 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 987 \\ 695 \\ 479 \\ 837 \\ \hline 654 \end{array}$$

$$\begin{array}{r} 4. \quad 8756 \\ 3804 \\ 929 \\ 8765 \\ \hline 300 \end{array}$$

$$\begin{array}{r} 2. \quad 3856 \\ \times 307 \\ \hline \end{array}$$

$$5. \quad 525 \div 49$$

$$6. \quad 309 \times 408 =$$

$$7. \quad 25625 \div 125 =$$

$$8. \quad \text{Find the sum of (a) } \frac{1}{4} + \frac{3}{8} + \frac{7}{8}; \text{ (b) } 3\frac{2}{5} + 2\frac{3}{10}.$$

9. At 25¢ a square yard what is the cost of painting a floor $21' \times 24'$?

10. Make a scale drawing of a rectangle $24' \times 36'$, using a scale of 1 in. to 12 ft.

11. My spelling grades for this week were 80, 86, 90, 84, 86. Find my daily average in spelling for the week.

12. Our milk bill for December was \$5.58. This was an average of _____ cents a day.

13. If you know that milk sells for 12¢ a quart, can you find how many quarts of milk we used during December?

14. I am the Scout Master of a Boy Scout troupe. I have just ordered 4 dozen caps at \$1.25 each. What will they cost me?

15. Which is larger, a rectangle $8' \times 9'$ or a square 3 yd. on a side?

$$16. \quad \text{Supply the missing numbers: } \frac{7}{8} = \frac{?}{16}; \frac{3}{5} = \frac{?}{10}; \frac{3}{4} = \frac{?}{12}.$$

$$17. \quad \text{Change to mixed numbers: } \frac{12}{9}; \frac{15}{12}; \frac{20}{15}.$$

18. Using a scale of $\frac{1}{8}$ in. to 1 ft., draw a line representing a length of 5 ft.

19. Find the cost of $2\frac{1}{2}$ lb. of butter at 60¢ a pound, and $\frac{3}{4}$ lb. of wafers at 20¢ a pound.

20. Potatoes were selling at \$1.60 a bushel. What would a quarter of a peck of potatoes have cost?

21. How many square rods are there in an acre?

Progress Test No. 3

Write only the answers to these examples on your paper. Number each answer. (Record your score.)

1. Find the average of 56, 75, 83, and 97.
2. Drawn to a scale of $\frac{1}{2}$ in. to 10 ft., a line 2 in. long represents a distance of ____ ft.
3. $7\frac{7}{8} + 3\frac{1}{4} =$
4. $2\frac{3}{5} + 3\frac{1}{10} =$
5. Divide 2956 by 28.
6. There are ____ sq. in. in 3 sq. ft.
7. \$61.79
8.67
98.49
7.56
3.98
7.46
8. Subtract $1\frac{1}{3}$ from $4\frac{5}{6}$.
9. Subtract 4876 from 9000.
10. Find the area and the perimeter of a square whose side is 5'' long.
11. What kind of a fraction is $\frac{3.0}{5}$?
12. Doris wants to make nine handkerchiefs for Christmas gifts. She needs a 12-in. square of linen for each handkerchief. If the linen is a yard wide, how long a piece must she buy? Tell in yards.
13. Using a scale of 1 in. to 1 ft., draw a diagram of the piece of linen Doris will buy and draw lines to show where she will cut it to divide it into handkerchiefs.
14. The linen for the handkerchiefs costs \$1.15 a yard. Doris will need 6 skeins of floss to embroider them. The floss sells at 3 skeins for 10¢. How much will the materials for the handkerchiefs cost? Find the average cost of a handkerchief.
15. How many strips of muslin 3 in. wide can be torn from a piece of muslin 1 yd. wide?

Standards: X, 12. Y, 10. Z, 8.

CHAPTER IV

FRACTIONS

A Reading Lesson on Fractions

Here is a reading lesson on fractions. See if you can fill in all the missing words.

1. Fractions cannot be added or subtracted unless they have the same _____. This denominator is called a common denominator. Sometimes the number you use for the common _____ is one of the given denominators. When you add $\frac{1}{2}$ and $\frac{1}{4}$, the common denominator is one of the given denominators. When you subtract $\frac{1}{8}$ from $\frac{3}{4}$, the common denominator is _____.

2. Fractions such as $\frac{3}{4}$, $\frac{2}{5}$, and $\frac{1}{3}$ are called _____ fractions. Fractions such as $\frac{4}{3}$, $\frac{3}{2}$, and $\frac{5}{5}$ are called _____ fractions. Numbers like $1\frac{1}{3}$, $1\frac{1}{4}$, and $3\frac{1}{2}$ are called _____ numbers. An improper fraction can always be changed to a whole or _____ number.

3. When $\frac{5}{4}$ is changed to a _____ number, the answer is _____. When mixed numbers are added, the fractions are added first and then the whole numbers are added.

4. When $1\frac{3}{4}$ is added to $2\frac{1}{8}$, the sum of the $\frac{3}{4}$ and the $\frac{1}{8}$ is _____; the sum of the 1 and 2 is _____; the answer is _____.

$$\begin{array}{r} 1\frac{3}{4} \\ 2\frac{1}{8} \\ \hline 3\frac{7}{8} \end{array}$$

5. When $1\frac{5}{6}$ is added to $3\frac{1}{3}$, the sum of the $\frac{5}{6}$ and $\frac{1}{3}$ is _____; the sum of the 3 and 1 is _____; the answer is _____.

$$\begin{array}{r} 1\frac{5}{6} \\ 3\frac{1}{3} \\ \hline 4\frac{7}{6} \end{array}$$

6. But $\frac{7}{6}$ is an improper fraction which can be changed to the _____ number $1\frac{1}{6}$. Adding the mixed number $1\frac{1}{6}$ to the sum of the whole numbers (which is 4), the answer is _____.

$$4\frac{7}{6} = 4 + 1\frac{1}{6} = 5\frac{1}{6}$$

7. If you subtract $1\frac{1}{2}$ from $4\frac{5}{6}$, the answer is _____.

Adding and Subtracting Fractions and Mixed Numbers

Add:

$$\begin{array}{r} 1. \quad \frac{1}{2} \\ \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad \frac{1}{5} \\ \frac{1}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad \frac{1}{6} \\ \frac{1}{12} \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad \frac{1}{2} \\ \frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad \frac{1}{4} \\ \frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad \frac{1}{12} \\ \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad \frac{1}{12} \\ \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad \frac{1}{2} \\ \frac{3}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad \frac{3}{4} \\ \frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad \frac{2}{3} \\ \frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 11. \quad \frac{1}{4} \\ \frac{3}{16} \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad \frac{5}{16} \\ \frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 13. \quad \frac{3}{8} \\ \frac{1}{8} \\ \frac{3}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 14. \quad \frac{1}{3} \\ \frac{1}{3} \\ \frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 15. \quad \frac{1}{2} \\ \frac{1}{3} \\ \frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 16. \quad \frac{1}{3} \\ \frac{1}{4} \\ \frac{1}{12} \\ \hline \end{array}$$

$$\begin{array}{r} 17. \quad \frac{1}{2} \\ \frac{1}{5} \\ \frac{1}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 18. \quad \frac{1}{3} \\ \frac{1}{12} \\ \frac{1}{6} \\ \hline \end{array}$$

The sum in each of the examples below is an improper fraction. Change it to a mixed number.

$$\begin{array}{r} 19. \quad \frac{3}{8} \\ \frac{5}{8} \\ \frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 20. \quad \frac{3}{10} \\ \frac{2}{5} \\ \frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 21. \quad \frac{5}{12} \\ \frac{2}{3} \\ \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 22. \quad \frac{5}{16} \\ \frac{3}{8} \\ \frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 23. \quad \frac{7}{16} \\ \frac{3}{4} \\ \frac{3}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 24. \quad \frac{7}{8} \\ \frac{1}{2} \\ \frac{1}{4} \\ \hline \end{array}$$

Add these mixed numbers:

$$\begin{array}{r} 25. \quad 3\frac{1}{8} \\ 5\frac{5}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 26. \quad 2\frac{5}{12} \\ 1\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 27. \quad 3\frac{1}{8} \\ 5\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 28. \quad 6\frac{1}{4} \\ 2\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 29. \quad 7\frac{1}{8} \\ 5\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 30. \quad 3\frac{1}{10} \\ 2\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 31. \quad 5\frac{3}{4} \\ 6\frac{3}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 32. \quad 7\frac{5}{6} \\ 3\frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 33. \quad 7\frac{7}{12} \\ 7\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 34. \quad 8\frac{7}{8} \\ 4\frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 35. \quad 9\frac{5}{8} \\ 2\frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 36. \quad 6\frac{3}{4} \\ 7\frac{5}{8} \\ \hline \end{array}$$

Subtract:

$$\begin{array}{r} 37. \quad \frac{7}{16} \\ \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 38. \quad \frac{5}{8} \\ \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 39. \quad \frac{7}{12} \\ \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 40. \quad \frac{9}{16} \\ \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 41. \quad \frac{7}{12} \\ \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 42. \quad \frac{3}{4} \\ \frac{5}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 43. \quad 9\frac{5}{12} \\ 6\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 44. \quad 10\frac{7}{12} \\ 4\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 45. \quad 8\frac{5}{16} \\ 5\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 46. \quad 6\frac{7}{8} \\ 3\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 47. \quad 7\frac{7}{12} \\ 2\frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 48. \quad 9\frac{7}{10} \\ 4\frac{1}{2} \\ \hline \end{array}$$

Finding Common Denominators

(1) When you try to add $\frac{1}{2}$ to $\frac{1}{3}$, can you use 2 for the common denominator? Can you use 3? Let's try to find what numbers you can use.

$$(2) \frac{1}{2} = \frac{?}{4} = \frac{?}{6} = \frac{?}{8} = \frac{?}{10} = \frac{?}{12} = \frac{?}{16}.$$

$$(3) \frac{1}{3} = \frac{?}{6} = \frac{?}{9} = \frac{?}{12}.$$

(4) Looking at (2) and (3), tell whether halves and thirds can both be changed to 4ths; to 6ths.

(5) Can halves and thirds both be changed to eighths? to twelfths?

(6) Since $\frac{1}{2}$ and $\frac{1}{3}$ can both be changed to sixths and twelfths, we say that 6 or 12 is a common denominator of $\frac{1}{2}$ and $\frac{1}{3}$.

(7) When you add $\frac{1}{2}$ and $\frac{1}{3}$, think: $\frac{1}{2} = \frac{?}{6}$; $\frac{1}{3} = \frac{?}{6}$; $\frac{3}{6} + \frac{2}{6} = \frac{?}{6}$.

NOTE. You can always find more than one common denominator; but you should use the smallest one, because it is easiest.

$$(8) \text{ Complete: } \frac{1}{3} = \frac{?}{6} = \frac{?}{9} = \frac{?}{12}.$$

$$(9) \frac{1}{4} = \frac{?}{8} = \frac{?}{12} = \frac{?}{16}.$$

(10) Can you tell by looking at (8) and (9) what common denominator can be used in adding $\frac{1}{3}$ and $\frac{1}{4}$?

(11) In adding $\frac{1}{3}$ and $\frac{1}{4}$, think: $\frac{1}{3} = \frac{?}{12}$; $\frac{1}{4} = \frac{?}{12}$; $\frac{?}{12} + \frac{?}{12} = \frac{?}{12}$.

(12) In adding $\frac{1}{6}$ and $\frac{1}{4}$ think: $\frac{1}{6} = \frac{?}{12}$; $\frac{1}{4} = \frac{?}{12}$; $\frac{?}{12} + \frac{?}{12} = \frac{?}{12}$.

(13) In subtracting $\frac{1}{5}$ from $\frac{1}{2}$ think: $\frac{1}{5} = \frac{?}{10}$; $\frac{1}{2} = \frac{?}{10}$; $\frac{5}{10} - \frac{2}{10} = \frac{?}{10}$.

(14) In adding $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$, think: $\frac{1}{2} = \frac{?}{12}$; $\frac{1}{3} = \frac{?}{12}$; $\frac{1}{4} = \frac{?}{12}$; $\frac{?}{12} + \frac{?}{12} + \frac{?}{12} = \frac{?}{12}$.

(15) What would you think in finding the difference between $4\frac{3}{5}$ and $2\frac{1}{2}$?

(16) Find the difference between $3\frac{1}{3}$ and $4\frac{3}{4}$.

Common Denominators

What common denominators would you use if you were adding or subtracting in these examples?

- | | | | |
|----------------------------------|-----------------------------------|------------------------------------|--|
| 1. $\frac{1}{2} + \frac{1}{3} =$ | 5. $\frac{1}{5} + \frac{1}{2} =$ | 9. $\frac{1}{6} + \frac{1}{3} =$ | 13. $\frac{1}{3} + \frac{1}{2} + \frac{1}{4} =$ |
| 2. $\frac{1}{3} - \frac{1}{4} =$ | 6. $\frac{1}{2} - \frac{1}{6} =$ | 10. $\frac{5}{6} + \frac{1}{12} =$ | 14. $\frac{1}{4} + \frac{1}{6} + \frac{1}{3} =$ |
| 3. $\frac{1}{3} - \frac{1}{6} =$ | 7. $\frac{1}{3} - \frac{1}{12} =$ | 11. $\frac{1}{2} - \frac{1}{5} =$ | 15. $\frac{1}{8} + \frac{1}{2} + \frac{1}{4} =$ |
| 4. $\frac{3}{4} - \frac{2}{3} =$ | 8. $\frac{1}{4} - \frac{1}{12} =$ | 12. $\frac{1}{4} + \frac{1}{6} =$ | 16. $\frac{1}{12} + \frac{1}{6} + \frac{1}{4} =$ |

Some children use the following rule for finding common denominators: *The product of the given denominators of any fractions is a common denominator.*

17. Using the rule, what do you find the common denominator in Example 3 above to be? in Example 7? 12? 13? 14? 15? 16? Can you find a better common denominator in each example? What is it?

18. Do you see that the rule very often gives you a large common denominator? Always try first to tell by looking at the example what the smallest common denominator is. If you cannot tell, then use the above rule to get a common denominator.

19. Find the answers to Examples 1 to 16.

Add:

- | | | | | | | | | |
|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 20. $\frac{1}{2}$ | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{2}{3}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{2}{3}$ | $\frac{7}{8}$ | $\frac{3}{5}$ |
| $\frac{1}{3}$ | $\frac{1}{5}$ | $\frac{1}{4}$ | $\frac{1}{6}$ | $\frac{1}{2}$ | $\frac{1}{4}$ | $\frac{1}{2}$ | $\frac{1}{2}$ | $\frac{1}{2}$ |

21. Do each of the examples in Ex. 20 as subtraction examples.

22. $\frac{1}{4}$ lb. = ____ oz.; $\frac{1}{2}$ lb. = ____ oz.; $\frac{3}{4}$ lb. = ____ oz.; $\frac{5}{8}$ lb. = ____ oz.

23. $\frac{1}{4}$ yd. = ____ in.; $\frac{1}{2}$ yd. = ____ in.; $\frac{3}{4}$ yd. = ____ in.

24. $\frac{1}{4}$ doz. = ____; $\frac{1}{3}$ doz. = ____; $\frac{3}{4}$ doz. = ____; $\frac{2}{3}$ doz. = ____.

25. How much will $\frac{3}{4}$ lb. of 80-cent tea cost?

26. How much will $\frac{3}{8}$ lb. of 40-cent candy cost?

Fraction Facts

Tell what words belong in these blank spaces:

1. The ____ of a fraction tells into how many equal parts an object is divided.
2. The ____ of a fraction tells how many of the equal parts of an object you are thinking about.
3. In proper fractions the ____ is less than the ____.
4. In improper fractions the ____ is equal to or greater than the ____.
5. Fractions cannot be added or subtracted until they have the same ____.
6. In adding or subtracting fractions you should add or subtract the ____ but *never* add or subtract the ____.
7. $7\frac{1}{2}$ is called a ____ number.
8. The product of the denominators of two fractions is not always the ____ common denominator.

An Oral Test

- (1) Subtract 49 from 53; from 67; from 75; from 88.
- (2) Add 29 to 38; to 46; to 75; to 87.
- (3) Multiply 79 by 5; by 6; by 7; by 8; by 9.
- (4) Divide 114 by 6; by 7; by 8; by 9.
- (5) Find the area of a rectangle $7'' \times 18''$.
- (6) What is the perimeter of the rectangle in Example (5)?
- (7) Robert and Harry painted the fence in their back yard. Robert started at one end and painted $\frac{1}{2}$ of it. Harry started at the other end and painted $\frac{1}{3}$ of it. What part of it has been painted all together?
- (8) Mrs. Hill bought a half-dozen jelly glasses for 25¢. The glasses cost her ____¢ apiece.

A Written Test

1. $\begin{array}{r} 5 \\ 4 \\ 6 \\ 8 \\ 7 \\ 5 \end{array}$	2. $\begin{array}{r} 3 \\ 8 \\ 7 \\ 9 \\ 6 \\ 4 \end{array}$	3. $\begin{array}{r} 287 \\ 354 \\ 806 \\ 954 \\ 763 \\ 287 \end{array}$	4. $\begin{array}{r} 127894 \\ - 36958 \\ \hline \end{array}$	5. $\begin{array}{r} 50000 \\ - 4987 \\ \hline \end{array}$
			6. $\begin{array}{r} 208 \\ \times 907 \\ \hline \end{array}$	7. $\begin{array}{r} 387 \\ \times 4200 \\ \hline \end{array}$

8. Add $\frac{1}{4}$ and $\frac{2}{3}$.

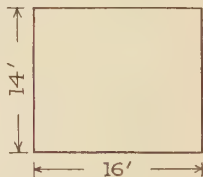
9. Subtract $\frac{1}{3}$ from $\frac{5}{6}$.

10. $28 \overline{)5684}$

11. $56 \overline{)2744}$

12. $89 \overline{)11907}$

13. How many square feet are there in the rectangle represented by this rectangle? How many square inches?



14. Marie made 36 Easter eggs. If she sells them all for 5¢ each, she will receive —.

15. The materials for the Easter eggs cost Marie 69¢. How much money will she gain if she sells all the eggs?

16. Mrs. Burns wants to make a dress for Peggy and one for Mary. She needs $1\frac{3}{4}$ yd. of material for each dress. How much material does she need for the two dresses?

Mixed Numbers

Can you find any mistakes in these addition examples?

a

$$\begin{array}{r} 4\frac{2}{3} = 4\frac{8}{12} \\ 3\frac{1}{4} = 3\frac{3}{12} \\ \hline 7\frac{11}{12} \end{array}$$

b

$$\begin{array}{r} 5\frac{5}{6} = 5\frac{10}{12} \\ 3\frac{1}{12} = 3\frac{1}{12} \\ \hline 8\frac{11}{12} \end{array}$$

c

$$\begin{array}{r} 4\frac{3}{8} = 4\frac{9}{24} \\ 2\frac{1}{3} = 2\frac{8}{24} \\ \hline 6\frac{17}{24} \end{array}$$

d

$$\begin{array}{r} 5\frac{2}{5} = 5\frac{4}{10} \\ 6\frac{1}{2} = 6\frac{5}{10} \\ \hline 11\frac{9}{10} \end{array}$$

e

$$\begin{array}{r} 3\frac{5}{6} = 3\frac{10}{12} \\ 2\frac{3}{4} = 2\frac{9}{12} \\ \hline 5\frac{19}{12} = 6\frac{7}{12} \end{array}$$

f

$$\begin{array}{r} 4\frac{2}{3} = 4\frac{4}{6} \\ 1\frac{5}{6} = 1\frac{5}{6} \\ \hline 5\frac{9}{6} = 6\frac{3}{6} \end{array}$$

g

$$\begin{array}{r} 5\frac{3}{4} = 5\frac{15}{20} \\ 2\frac{3}{5} = 2\frac{12}{20} \\ \hline 7\frac{27}{20} = 8\frac{7}{20} \end{array}$$

Reducing Fractions

$\frac{1}{2} = \frac{3}{6}$
$\frac{1}{6} = \frac{1}{6}$
$\frac{4}{6} = \frac{2}{3}$

(1) When Mary added $\frac{1}{2}$ and $\frac{1}{6}$, she got $\frac{4}{6}$.

(2) When Alma added $\frac{1}{2}$ and $\frac{1}{6}$, she got $\frac{2}{3}$.

(3) Which answer do you think is better?

(4) The teacher said that Alma's answer was better because it gave the answer in smaller numbers. She had *reduced the answer to lowest terms*.

When you have changed a fraction so that it has the smallest numbers it can have in the numerator and the denominator, we say that you have *reduced the fraction to lowest terms*.

$\frac{1}{2} = \frac{3}{6}$
$\frac{1}{6} = \frac{1}{6}$
$\frac{2}{6} = \frac{1}{3}$

(5) When Mary subtracted $\frac{1}{6}$ from $\frac{1}{2}$, she got $\frac{2}{6}$.

(6) When Alma subtracted $\frac{1}{6}$ from $\frac{1}{2}$, she got $\frac{1}{3}$.

(7) Which answer do you think is better?

Pupils who do good work in arithmetic always reduce fractional answers to lowest terms.

Complete:

1. $\frac{4}{8}$ is reduced to $\frac{1}{2}$ by dividing the 4 and the 8 by ____.

2. $\frac{5}{10}$ is reduced to $\frac{1}{2}$ by dividing the 5 and the 10 by ____.

3. $\frac{8}{12}$ is reduced to $\frac{2}{3}$ by dividing the 8 and the 12 by ____.

4. How is $\frac{9}{12}$ reduced to $\frac{3}{4}$?

7. How is $\frac{12}{15}$ reduced to $\frac{4}{5}$?

5. How is $\frac{12}{16}$ reduced to $\frac{3}{4}$?

8. How is $\frac{4}{6}$ reduced to $\frac{2}{3}$?

6. How is $\frac{8}{16}$ reduced to $\frac{1}{2}$?

9. How is $\frac{6}{16}$ reduced to $\frac{3}{8}$?

I asked Fred and Jane how to reduce a fraction to lowest terms.

Jane said, "To reduce a fraction to lowest terms, divide the numerator and the denominator by the same number."

Fred said, "To reduce a fraction to lowest terms, divide the numerator and the denominator by the *largest* number that can be divided into both of them."

Do you think that Fred's answer is the better or that Jane's is the better? Why?

Reducing Fractions

To reduce a fraction to lowest terms, divide the numerator and the denominator of the fraction by the largest number that can be divided into both of them.

When you reduce the following fractions to lowest terms, tell the largest number by which both the numerator and the denominator can be divided.

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>
1.	$\frac{5}{10}$	$\frac{12}{16}$	$\frac{6}{12}$	$\frac{8}{8}$	$\frac{4}{6}$	$\frac{8}{16}$	$\frac{4}{12}$	$\frac{8}{12}$
2.	$\frac{12}{12}$	$\frac{8}{10}$	$\frac{4}{16}$	$\frac{3}{12}$	$\frac{16}{16}$	$\frac{9}{12}$	$\frac{9}{15}$	$\frac{12}{15}$
3.	$\frac{4}{10}$	$\frac{6}{10}$	$\frac{2}{12}$	$\frac{10}{12}$	$\frac{12}{12}$	$\frac{3}{15}$	$\frac{5}{15}$	$\frac{6}{15}$
4.	$\frac{2}{16}$	$\frac{6}{12}$	$\frac{2}{10}$	$\frac{2}{8}$	$\frac{10}{16}$	$\frac{10}{10}$	$\frac{4}{8}$	$\frac{6}{16}$

(1) Florence was adding fractions and got $\frac{12}{24}$ for an answer. She thought $\frac{12}{24}$ was not in lowest terms; so she changed it to $\frac{6}{12}$. She divided both numerator and denominator by ____.

(2) Harold said, " $\frac{6}{12}$ is not in lowest terms because $\frac{6}{12} = \frac{3}{6}$." Harold divided both numerator and denominator of $\frac{6}{12}$ by ____.

(3) Albert said, " $\frac{3}{6}$ is not in lowest terms. You can still divide both numerator and denominator by ____ and get $\frac{1}{2}$. Then you have the fraction in lowest terms." Does $\frac{12}{24} = \frac{1}{2}$?

Florence learned that if at first you do not get a fraction in lowest terms you can go on dividing both numerator and denominator, and if you divide enough times the fraction will be in lowest terms.

Albert said to Florence, "If you had divided both numerator and denominator of $\frac{12}{24}$ by 12, you would have got the fraction to lowest terms at first."

Here are two ways to get $\frac{12}{24}$ to lowest terms:

$$(1) \quad \frac{12 \div 2}{24 \div 2} = \frac{6}{12} \quad \frac{6 \div 2}{12 \div 2} = \frac{3}{6} \quad \frac{3 \div 3}{6 \div 3} = \frac{1}{2} \qquad (2) \quad \frac{12 \div 12}{24 \div 12} = \frac{1}{2}$$

Which is shorter? Which way would you prefer to use?

Reducing Fractions

Some of these fractions are written in lowest terms. Others are not. Reduce to lowest terms all that are not written that way now.

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>
1.	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{6}{8}$	$\frac{7}{8}$	$\frac{8}{8}$	$\frac{8}{10}$	$\frac{8}{12}$
2.	$\frac{5}{6}$	$\frac{4}{6}$	$\frac{3}{6}$	$\frac{2}{6}$	$\frac{1}{6}$	$\frac{7}{12}$	$\frac{9}{12}$
3.	$\frac{3}{18}$	$\frac{9}{18}$	$\frac{7}{18}$	$\frac{18}{18}$	$\frac{6}{18}$	$\frac{3}{15}$	$\frac{5}{15}$
4.	$\frac{6}{15}$	$\frac{9}{15}$	$\frac{7}{14}$	$\frac{6}{12}$	$\frac{4}{12}$	$\frac{3}{12}$	$\frac{5}{12}$

In the following examples reduce answers to lowest terms whenever possible. Remember that fractional answers will be incorrect from now on unless they are reduced to lowest terms.

Add:

- | | | | | | | |
|--|---|---|--|---|--|--|
| 5. $\frac{8}{12}$
<u>$\frac{1}{6}$</u> | 6. $\frac{4}{8}$
<u>$\frac{1}{6}$</u> | 7. $\frac{2}{5}$
<u>$\frac{2}{10}$</u> | 8. $\frac{5}{8}$
<u>$\frac{1}{4}$</u> | 9. $\frac{2}{3}$
<u>$\frac{3}{4}$</u> | 10. $\frac{4}{12}$
<u>$\frac{1}{3}$</u> | 11. $\frac{5}{8}$
<u>$\frac{3}{8}$</u> |
| 12. $3\frac{3}{8}$
<u>$4\frac{1}{4}$</u> | 13. $55\frac{1}{3}$
<u>$6\frac{1}{4}$</u> | 14. $2\frac{5}{6}$
<u>$3\frac{1}{12}$</u> | 15. $8\frac{5}{8}$
<u>$1\frac{1}{4}$</u> | 16. $4\frac{6}{8}$
<u>$5\frac{1}{16}$</u> | 17. $9\frac{2}{3}$
<u>$6\frac{1}{6}$</u> | 18. $\frac{7}{12}$
<u>$\frac{5}{12}$</u> |

Subtract:

- | | | | | | | |
|---|--|---|---|--|--|--|
| 19. $\frac{4}{8}$
<u>$\frac{1}{4}$</u> | 20. $\frac{6}{12}$
<u>$\frac{1}{3}$</u> | 21. $\frac{6}{9}$
<u>$\frac{1}{3}$</u> | 22. $\frac{4}{16}$
<u>$\frac{1}{8}$</u> | 23. $\frac{9}{12}$
<u>$\frac{1}{3}$</u> | 24. $\frac{12}{16}$
<u>$\frac{1}{2}$</u> | 25. $\frac{1}{3}$
<u>$\frac{1}{12}$</u> |
| 26. $\frac{5}{8}$
<u>$\frac{1}{2}$</u> | 27. $\frac{7}{8}$
<u>$\frac{1}{4}$</u> | 28. $\frac{5}{6}$
<u>$\frac{1}{3}$</u> | 29. $\frac{7}{10}$
<u>$\frac{1}{2}$</u> | 30. $\frac{7}{12}$
<u>$\frac{1}{4}$</u> | 31. $\frac{5}{8}$
<u>$\frac{1}{4}$</u> | 32. $\frac{3}{4}$
<u>$\frac{1}{3}$</u> |
| 33. $\frac{7}{16}$
<u>$\frac{1}{8}$</u> | 34. $\frac{2}{3}$
<u>$\frac{1}{4}$</u> | 35. $\frac{3}{3}$
<u>$\frac{1}{6}$</u> | 36. $\frac{5}{6}$
<u>$\frac{2}{3}$</u> | 37. $\frac{7}{10}$
<u>$\frac{1}{5}$</u> | 38. $\frac{7}{12}$
<u>$\frac{1}{3}$</u> | 39. $\frac{7}{15}$
<u>$\frac{1}{5}$</u> |
| 40. $8\frac{7}{12}$
<u>$7\frac{1}{4}$</u> | 41. $9\frac{1}{2}$
<u>$4\frac{1}{3}$</u> | 42. $5\frac{7}{10}$
<u>$3\frac{1}{2}$</u> | 43. $5\frac{3}{4}$
<u>$\frac{1}{2}$</u> | 44. $9\frac{5}{6}$
<u>$4\frac{1}{3}$</u> | 45. $5\frac{5}{8}$
<u>$\frac{1}{2}$</u> | 46. $8\frac{7}{8}$
<u>$3\frac{1}{4}$</u> |

Improper Fractions and Mixed Numbers

$$\begin{aligned}\frac{5}{8} &= \frac{5}{8} \\ \frac{3}{4} &= \frac{6}{8} \\ \frac{7}{8} &= \frac{7}{8} \\ \frac{18}{8} &= 2\frac{2}{8} = 2\frac{1}{4}\end{aligned}$$

Very often, when you add fractions, your answer is an improper fraction. This should always be reduced to a mixed number or a whole number. Whenever the fraction of the mixed number is not in lowest terms, be sure to reduce it.

Explain the work that has been done in this box.

Reduce each of the following improper fractions to whole numbers or mixed numbers.

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>
1. $\frac{8}{5}$	$\frac{9}{3}$	$\frac{6}{5}$	$\frac{7}{5}$	$\frac{8}{5}$	$\frac{9}{5}$	$\frac{10}{5}$	$\frac{14}{3}$
2. $\frac{12}{3}$	$\frac{13}{3}$	$\frac{15}{3}$	$\frac{7}{2}$	$\frac{8}{3}$	$\frac{17}{6}$	$\frac{17}{5}$	$\frac{17}{4}$
3. $\frac{10}{2}$	$\frac{9}{2}$	$\frac{11}{2}$	$\frac{7}{3}$	$\frac{13}{5}$	$\frac{18}{5}$	$\frac{18}{6}$	$\frac{19}{6}$
4. $\frac{16}{3}$	$\frac{16}{5}$	$\frac{17}{5}$	$\frac{18}{6}$	$\frac{21}{5}$	$\frac{25}{5}$	$\frac{24}{5}$	$\frac{29}{6}$

In each of these examples reduce the improper fraction to a mixed number, and wherever possible reduce the fraction of the mixed number to lowest terms. ($\frac{10}{8} = 1\frac{2}{8} = 1\frac{1}{4}$.)

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>
5. $\frac{9}{6}$	$\frac{12}{8}$	$\frac{14}{6}$	$\frac{18}{8}$	$\frac{19}{6}$	$\frac{22}{3}$	$\frac{21}{6}$	$\frac{20}{8}$
6. $\frac{14}{4}$	$\frac{18}{4}$	$\frac{21}{9}$	$\frac{28}{8}$	$\frac{27}{6}$	$\frac{30}{9}$	$\frac{33}{6}$	$\frac{39}{9}$
7. $\frac{15}{3}$	$\frac{16}{3}$	$\frac{17}{3}$	$\frac{18}{3}$	$\frac{20}{4}$	$\frac{21}{4}$	$\frac{22}{4}$	$\frac{23}{4}$
8. $\frac{30}{6}$	$\frac{31}{6}$	$\frac{32}{6}$	$\frac{33}{6}$	$\frac{34}{6}$	$\frac{35}{6}$	$\frac{36}{6}$	$\frac{37}{6}$
9. $\frac{32}{8}$	$\frac{33}{8}$	$\frac{34}{8}$	$\frac{35}{8}$	$\frac{36}{8}$	$\frac{37}{8}$	$\frac{38}{8}$	$\frac{39}{8}$
10. $\frac{36}{9}$	$\frac{37}{9}$	$\frac{38}{9}$	$\frac{39}{9}$	$\frac{40}{9}$	$\frac{41}{9}$	$\frac{42}{9}$	$\frac{43}{9}$
11. $\frac{24}{12}$	$\frac{25}{12}$	$\frac{26}{12}$	$\frac{27}{12}$	$\frac{28}{12}$	$\frac{29}{12}$	$\frac{30}{12}$	$\frac{31}{12}$

More Practice with Mixed Numbers

(1) Some children were given this example in adding mixed numbers :

$\begin{array}{r} 2\frac{5}{12} \\ 4\frac{3}{4} \\ \hline ? \end{array}$
--

(2) George got $6\frac{14}{12}$. Henry's answer was $7\frac{2}{12}$. Mary had $7\frac{1}{6}$. Which pupil had the best answer? the poorest? Why?

(3) Complete: George forgot to change the improper fraction $\frac{14}{12}$ to a ____ _____. Henry forgot to reduce the fraction part of his answer to ____ _____.

When you do these additions, don't be like George and Harry, forgetting to finish your examples.

$\begin{array}{r} 5\frac{9}{16} \\ 5 \\ 4\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 8\frac{3}{4} \\ 4\frac{7}{12} \\ \hline \end{array}$	$\begin{array}{r} \frac{1}{2} \\ \frac{5}{12} \\ \frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{3}{8} \\ \frac{3}{4} \\ 3\frac{5}{16} \\ \hline \end{array}$	$\begin{array}{r} 6\frac{3}{8} \\ 8\frac{1}{4} \\ 4\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{3}{10} \\ 2\frac{1}{2} \\ 8\frac{3}{5} \\ \hline \end{array}$
---	---	---	---	---	--

$\begin{array}{r} 3\frac{3}{4} \\ \frac{7}{12} \\ \frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{5}{16} \\ 9 \\ 3\frac{11}{16} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{3}{8} \\ \frac{3}{16} \\ \frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 5\frac{3}{4} \\ 2\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{1}{12} \\ 2\frac{1}{3} \\ 5\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{2}{3} \\ 6\frac{5}{6} \\ 3\frac{1}{6} \\ \hline \end{array}$
--	---	--	--	--	---

$\begin{array}{r} 4\frac{3}{4} \\ 5\frac{1}{2} \\ 8\frac{3}{8} \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 9 \\ 4\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{5}{6} \\ 5\frac{1}{12} \\ 6\frac{1}{12} \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 2\frac{1}{2} \\ 4\frac{3}{5} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{3}{4} \\ 7 \\ 5\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{1}{6} \\ 5 \\ 6\frac{3}{4} \\ \hline \end{array}$
---	--	---	--	--	--

$\begin{array}{r} 8 \\ 5 \\ 4\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{5}{8} \\ 6 \\ 8\frac{3}{8} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{3}{4} \\ 5\frac{1}{2} \\ 9\frac{3}{8} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{1}{4} \\ 5 \\ 8\frac{3}{8} \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 9\frac{1}{8} \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 9\frac{3}{4} \\ 6\frac{1}{2} \\ 3\frac{1}{12} \\ \hline \end{array}$
---	--	---	--	---	--

Subtract:

$\begin{array}{r} 2\frac{3}{4} \\ 1\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{1}{2} \\ 1\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{1}{2} \\ 1\frac{1}{8} \\ \hline \end{array}$	$\begin{array}{r} 16\frac{5}{6} \\ 7\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 17\frac{3}{4} \\ 8\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 14\frac{1}{4} \\ 5\frac{1}{8} \\ \hline \end{array}$
---	---	---	--	--	--

Fraction Review

TEST I. (3 minutes)

1. Complete:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>
$\frac{1}{2} = \frac{?}{4}$	$\frac{5}{6} = \frac{?}{12}$	$\frac{3}{8} = \frac{?}{16}$	$\frac{3}{4} = \frac{?}{12}$	$\frac{2}{3} = \frac{?}{12}$	$\frac{5}{6} = \frac{?}{12}$	$\frac{5}{8} = \frac{?}{16}$

2. Reduce to lowest terms:

$\frac{4}{8}$	$\frac{5}{10}$	$\frac{6}{18}$	$\frac{9}{12}$	$\frac{12}{15}$	$\frac{12}{16}$	$\frac{6}{9}$	$\frac{8}{16}$
---------------	----------------	----------------	----------------	-----------------	-----------------	---------------	----------------

3. Reduce to mixed numbers or whole numbers:

$\frac{11}{4}$	$\frac{15}{4}$	$\frac{9}{2}$	$\frac{15}{5}$	$\frac{21}{4}$	$\frac{19}{3}$	$\frac{25}{6}$	$\frac{29}{7}$
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TEST II. (4 minutes)

1. $\frac{1}{4} + \frac{1}{12}$	2. $\frac{1}{4} + \frac{1}{3}$	3. $\frac{1}{3} - \frac{1}{6}$	4. $\frac{3}{4} - \frac{2}{3}$	5. $\frac{3}{10} + \frac{1}{2}$
6. $\frac{13}{8} + 2\frac{1}{4}$	7. $3\frac{3}{4} + 2\frac{1}{16}$	8. $2\frac{3}{4} + 1\frac{1}{2}$	9. $4\frac{1}{6} + 2\frac{3}{4}$	10. $6\frac{3}{5} + 4\frac{1}{2}$
				11. $7\frac{7}{8} - 6\frac{3}{16}$

TEST III. (3 minutes)

1. $\frac{1}{4}$	2. $\frac{1}{12}$	3. $\frac{3}{16}$	4. $\frac{9}{10}$	5. $\frac{3}{16}$	6. $\frac{1}{4}$	7. $\frac{3}{4}$	8. $\frac{3}{4}$
$\frac{1}{8}$	$\frac{1}{3}$	$\frac{2}{8}$	$\frac{2}{5}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{3}$
$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{2}{3}$

TEST IV. (4 minutes)

Subtract:

1. $\frac{3}{4}$	2. $\frac{9}{16}$	3. $\frac{5}{6}$	4. $\frac{7}{10}$	5. $\frac{7}{12}$	6. $\frac{7}{12}$	7. $\frac{4}{5}$	8. $\frac{5}{6}$
$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{2}{5}$	$\frac{1}{4}$
9. $9\frac{3}{5}$	10. $8\frac{3}{4}$	11. $16\frac{5}{6}$	12. $8\frac{3}{4}$	13. $5\frac{5}{6}$			
$2\frac{1}{2}$	$2\frac{1}{3}$	$3\frac{1}{3}$	$2\frac{1}{2}$	$2\frac{1}{2}$			

Problem Study

1. If you buy a hat that costs \$2 and three collars at 37¢ each, how much change should you get from a 5-dollar bill? (If you have trouble with this problem, try Example 1, page 33, which is like it but easier. Then come back to this one.)

2. Bert sold 4 of his little chickens for 30¢ each. He wants to use the money to buy some quoits that cost 40¢ each. How many quoits can he get? (If you have trouble with this problem, see Example 2, page 33.)

3. Mr. Jones bought an automobile for \$750. He spent \$284.49 for repairs, and then sold it for \$1200. How much did he gain on it? (See Example 3, page 33.)

4. My mother bought 4 bu. of potatoes. She said that we use about 2 pk. of potatoes each week; so the 4 bu. ought to last us ____ weeks. (See Example 4, page 33.)

5. My brother can ride 10 miles an hour on his bicycle. How long will it take him to go 25 miles? (Example 5, page 33.)

6. A train which travels 154 miles in 4 hours travels at the rate of ____ miles an hour. (See Example 6, page 33.)

7. Find the cost of finishing a floor $18' \times 20'$ at 25¢ a square yard. (See Example 7, page 33.)

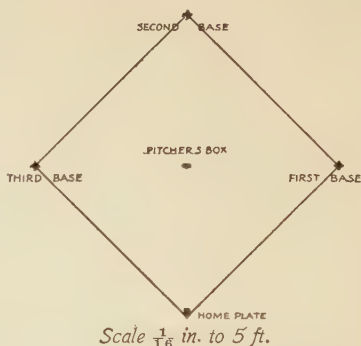
8. Earl earned \$9.00. His father told him that he should save $\frac{1}{4}$ of it. How much should Earl save? (See Example 8, page 33.)

9. If 3 pencils cost 10¢, $1\frac{1}{2}$ dozen pencils will cost _____. (See Example 9, page 33.)

10. One day an agent collected bills of \$12.49, \$20.05, \$18.19, and \$16.50. At the end of the day he had \$66.23. Is that what he should have had? (See Example 10, page 33.)

Young Giants' Baseball Team*

1. Jack and his chums have formed a baseball club. This is a map of their diamond. (It is really a square.) It was drawn to the scale of $\frac{1}{16}$ in. to 5 ft. That is, each $\frac{1}{16}$ in. represents 5 ft. Can you find how far it is from Home Plate to First Base, using your ruler? (How many $\frac{1}{16}$'s of an inch are there from Home Plate to First Base in the drawing?)



2. Jack made two "home runs" in one game. What is a home run? How many feet did Jack run when he made a home run? How many yards did he run in the two home runs?

3. The catcher threw the ball to the second baseman, trying to put Jack out. Measure and find out whether he threw the ball about 100 ft., 128 ft., or 150 ft.

4. The boys pay 25¢ a month for club dues. How much does each boy pay a year? There are 14 boys in the club. How much has the club collected in dues in a year?

5. The boys have sent in an order for 9 baseball suits at \$3.50 each, 1 mask at \$2.50, 1 fielder's glove at \$2.00, 1 baseman's mitt at \$2.25, $\frac{1}{2}$ doz. baseballs at \$.75 each, and 4 baseball bats at \$1.00 each. How much will all these things cost?

6. Is the \$42 the boys have collected in dues enough money to pay for this order? If not, how much more money do they need?

7. If the 14 boys in the club share the extra cost of \$4.75 equally, how much should each boy pay?

8. They are going to charge 15¢ admission at the Marysville game. If 50 people come and the two teams divide the money equally, how much will each team get?

Division with Zero *

Miss Miller asked her fifth-grade children to divide 84000 by 2400.

(1) This is the way Robert did it:

$$\begin{array}{r} 35 \\ 2400 \overline{)84000} \\ \underline{7200} \\ 12000 \\ \underline{12000} \\ 0 \end{array}$$

(2) This is the way Herbert did it:

$$\begin{array}{r} 35 \\ 2400 \overline{)84000} \\ \underline{72} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

(3) Who did it the shorter way?

(4) Miss Miller liked Herbert's way better. She said good workers did it that way.

Here are two examples done the long way and the short way:

<i>Long Way</i>	<i>Short Way</i>
75	75
$270 \overline{)20250}$	$270 \overline{)20250}$
$\underline{1890}$	$\underline{189}$
1350	135
$\underline{1350}$	$\underline{135}$

<i>Long Way</i>	<i>Short Way</i>
25	25
$3600 \overline{)90000}$	$3600 \overline{)90000}$
$\underline{7200}$	$\underline{72}$
18000	180
$\underline{18000}$	$\underline{180}$

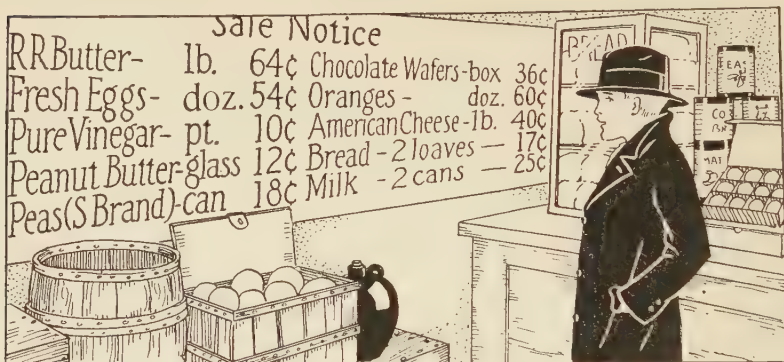
By studying these examples you will see that when the dividend and the divisor both end in zero or zeros, we can cross off the *same* number of zeros in the dividend and the divisor, and then divide as though they had never been there.

Do these divisions the short way:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $380 \overline{)9120}$	$360 \overline{)10080}$	$750 \overline{)18000}$	$2800 \overline{)120400}$
2. $5300 \overline{)137800}$	$6300 \overline{)113400}$	$730 \overline{)16790}$	$7400 \overline{)259000}$
3. $4500 \overline{)297000}$	$8700 \overline{)226200}$	$230 \overline{)18170}$	$9300 \overline{)148800}$

The Grocery Sale*

Teddy works in the grocery store that is having this sale.



Estimate how much he should charge for each of these orders.
Check each estimate by finding the exact amount of the order.

- | | |
|---|---|
| <p>1. $\frac{1}{2}$ lb. butter
1 can peas</p> | <p>9. $\frac{1}{8}$ lb. cheese
4 eggs</p> |
| <p>2. 1 qt. vinegar
$\frac{1}{2}$ doz. oranges</p> | <p>10. 4 loaves bread
$\frac{1}{2}$ lb. butter</p> |
| <p>3. $\frac{1}{2}$ doz. eggs
1 lb. cheese</p> | <p>11. 2 glasses peanut butter
2 cans peas</p> |
| <p>4. 2 loaves bread
1 doz. oranges</p> | <p>12. 6 cans milk
$\frac{1}{2}$ doz. oranges</p> |
| <p>5. 4 oranges
2 cans peas</p> | <p>13. $\frac{1}{4}$ doz. eggs
$\frac{1}{4}$ lb. butter</p> |
| <p>6. 2 cans milk
$\frac{1}{4}$ lb. butter</p> | <p>14. $2\frac{1}{2}$ lb. cheese
1 pt. vinegar</p> |
| <p>7. 2 qt. vinegar
1 doz. eggs</p> | <p>15. $1\frac{1}{2}$ doz. oranges
2 cans peas</p> |
| <p>8. $\frac{1}{4}$ lb. chocolate wafers
4 cans milk</p> | <p>16. 2 lb. butter
1 doz. eggs</p> |

A Review

$$\begin{array}{r} 1. \quad 58679 \\ - 49876 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 456 \\ \times 2800 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad \$469.80 \\ \quad 27.54 \\ \quad 308.00 \\ \quad 79.46 \\ \hline \quad 82.93 \end{array}$$

$$\begin{array}{r} 6. \quad 658 \\ \quad 204 \\ \quad 470 \\ \quad 658 \\ \hline \quad 473 \end{array}$$

$$\begin{array}{r} 2. \quad 409 \\ \times 608 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 50000 \\ - 8765 \\ \hline \end{array}$$

$$7. \quad 46 \overline{)1610}$$

$$8. \quad 45 \overline{)12035}$$

$$9. \quad 9500 \overline{)437000}$$

10. If 2 apples cost 5¢, what will 16 apples cost?

11. I read in the paper that 98,000 lb. of coal were shipped to the iron works. How many tons of coal is that? (1 ton = 2000 lb.)

12. Has a rug that is 6' $\times$ 6' the same area as one that is 4' $\times$ 9'?

In each of these addition and subtraction examples the answer is either incorrect or not written in the best form. Can you find all the mistakes? Could a smaller common denominator have been used in any of the examples?

$$\begin{array}{r} 13. \quad \frac{3}{10} = \frac{6}{20} \\ + \frac{1}{2} = \frac{10}{20} \\ \hline \frac{16}{20} \end{array}$$

$$\begin{array}{r} 14. \quad \frac{7}{8} = \frac{7}{8} \\ \frac{3}{4} = \frac{6}{8} \\ \hline \frac{13}{8} \end{array}$$

$$\begin{array}{r} 15. \quad 3\frac{5}{8} = 3\frac{15}{18} \\ + 4\frac{2}{3} = 4\frac{12}{18} \\ \hline 7\frac{27}{18} \end{array}$$

$$\begin{array}{r} 16. \quad 8\frac{3}{5} = 8\frac{6}{10} \\ - 2\frac{3}{10} = 2\frac{3}{10} \\ \hline 6\frac{9}{10} \end{array}$$

$$\begin{array}{r} 17. \quad \frac{15}{16} = \frac{15}{16} \\ - \frac{3}{8} = \frac{6}{16} \\ \hline \frac{8}{16} = \frac{1}{2} \end{array}$$

$$\begin{array}{r} 18. \quad \frac{2}{3} = \frac{6}{12} \\ \frac{3}{4} = \frac{9}{12} \\ \hline \frac{15}{12} \end{array}$$

$$\begin{array}{r} 19. \quad 5 = 5 \\ \quad 3\frac{3}{4} = 3\frac{18}{24} \\ + 2\frac{5}{6} = 2\frac{20}{24} \\ \hline 10\frac{30}{24} = 11\frac{6}{24} \end{array}$$

$$\begin{array}{r} 20. \quad 5\frac{3}{8} = 5\frac{6}{16} \\ \quad 6\frac{1}{2} = 6\frac{8}{16} \\ \quad 2\frac{3}{4} = 2\frac{12}{16} \\ \hline 13\frac{26}{16} \end{array}$$

Four Fact Tests

Tell the missing numbers in these examples. (You may refer to the tables at the back of the book if you need to.)

TEST I

- | | |
|------------------|---------------------------|
| 1. ? in. = 1 ft. | 6. ? sq. in. = 1 sq. ft. |
| 2. ? ft. = 1 rd. | 7. ? sq. rd. = 1 acre |
| 3. ? in. = 1 yd. | 8. ? sq. ft. = 1 sq. yd. |
| 4. ? rd. = 1 mi. | 9. ? acre = 1 sq. mi. |
| 5. ? ft. = 1 mi. | 10. 2 sq. yd. = ? sq. ft. |

TEST II

- | | | |
|-------------------------------|--------------------------------|-----------------------|
| 1. ? sec. = 1 min. | 4. ? min. = 1 hr. | 7. ? hr. = 1 da. |
| 2. $\frac{1}{2}$ hr. = ? min. | 5. $\frac{1}{2}$ min. = ? sec. | 8. ? da. = 1 yr. |
| 3. $\frac{1}{4}$ hr. = ? min. | 6. ? mo. = 1 yr. | 9. ? da. = 1 leap yr. |

TEST III

- | | | |
|------------------------------|-------------------|-------------------------------|
| 1. ? oz. = 1 lb. | 4. ? lb. = 1 ton | 7. ? qt. = 1 bu. |
| 2. ? gills = 1 pt. | 5. ? qt. = 1 gal. | 8. $\frac{1}{2}$ gal. = ? qt. |
| 3. ? oz. = $\frac{1}{2}$ lb. | 6. ? pk. = 1 bu. | 9. ? pt. = 1 gal. |

TEST IV

1. Square miles, _____, _____, _____ and _____ are used to measure area.
2. Inches, _____, _____, and _____ are used to measure length.
3. Pints, quarts, and _____ are used to measure liquids.
4. Pints, _____, _____, and _____ are used in dry measure.
5. Ounces, _____, and _____ are used to measure weight.
6. Temperature is measured in _____.
7. Hours, minutes, and _____ are used to measure time.
8. The common coins of United States money are . . .
9. The names of the months of the year are . . .
10. The months that have 30 days are . . .

Division

(1) When you were in the fourth grade, if you had written the answer to this division example as $407\frac{2}{8}$, it would have been marked as correct. Do you think it would be marked correct in the fifth grade? Why? What answer would you write now?

$$\begin{array}{r} 8 \overline{)3258} \\ 407\frac{2}{8} \end{array}$$

(2) If a fourth-grade child did this work, would it be marked as correct? Is it correct for a fifth-grade child? What answer would you write?

$$\begin{array}{r} 203\frac{9}{8} \\ 36 \overline{)7317} \\ \underline{72} \\ 117 \\ \underline{108} \\ 9 \end{array}$$

If there is a remainder in a division example, write it as a fraction and reduce the fraction to lowest terms.

Do these divisions, reducing the fractional remainders to lowest terms, like this: —————→

$$\begin{array}{r} 8 \overline{)50} \\ 6\frac{2}{8} = 6\frac{1}{4} \end{array}$$

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $9 \overline{)192}$	$8 \overline{)676}$	$6 \overline{)3754}$	$8 \overline{)2444}$
2. $4 \overline{)2254}$	$6 \overline{)4478}$	$8 \overline{)3586}$	$9 \overline{)8475}$
3. $6 \overline{)3879}$	$9 \overline{)8139}$	$7 \overline{)2857}$	$5 \overline{)2836}$
4. $25 \overline{)865}$	$18 \overline{)891}$	$27 \overline{)1575}$	$24 \overline{)1620}$
5. $36 \overline{)2097}$	$21 \overline{)1246}$	$35 \overline{)2002}$	$45 \overline{)3573}$
6. $45 \overline{)1044}$	$36 \overline{)620}$	$48 \overline{)1220}$	$54 \overline{)1284}$
7. $72 \overline{)1485}$	$81 \overline{)2880}$	$64 \overline{)1944}$	$56 \overline{)2289}$
8. $63 \overline{)1792}$	$28 \overline{)2124}$	$49 \overline{)3815}$	$63 \overline{)3357}$

Summary

1. Name the smallest common denominator you can use in each of these examples :

$$\frac{1}{2} + \frac{1}{6} + \frac{1}{12}; \quad \frac{1}{4} + \frac{1}{8} + \frac{1}{2}; \quad \frac{1}{12} + \frac{1}{6} + \frac{1}{4}; \quad \frac{1}{2} + \frac{1}{4} + \frac{1}{3}.$$

2. Reduce each of these fractions to lowest terms :

$$\frac{6}{12}; \quad \frac{9}{15}; \quad \frac{12}{16}; \quad \frac{9}{12}; \quad \frac{10}{20}; \quad \frac{10}{16}; \quad \frac{9}{18}; \quad \frac{8}{20}.$$

3. Change these improper fractions to mixed numbers :

$$\frac{14}{3}; \quad \frac{9}{4}; \quad \frac{15}{6}; \quad \frac{12}{7}; \quad \frac{18}{5}; \quad \frac{16}{3}; \quad \frac{21}{5}; \quad \frac{22}{4}.$$

4. Are these numbers written in the best form? If not, change them as you think they should be.

$$2\frac{6}{5}; \quad \frac{7}{4}; \quad \frac{8}{12}; \quad \frac{8}{8}; \quad \frac{7}{10}; \quad 3\frac{9}{6}; \quad 4\frac{2}{3}; \quad 4\frac{8}{8}.$$

5. The distance around a rectangle is called its ____.

6. The area of a rectangle equals the number of units in its ____ times the number of units in its ____.

7. To check a division example, multiply the ____ by the ____ and add the _____. The sum should equal the ____.

8. Using the scale 1 in. to 40 mi., this line _____ represents a distance of ____ miles.

9. The area of a square whose side is 9' is ____ sq. yd.

Add:

$$\begin{array}{r} 10. \quad \frac{3}{8} \\ \quad \frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 11. \quad 3\frac{1}{8} \\ \quad 5\frac{3}{4} \\ \quad 2\frac{1}{2} \\ \hline \end{array}$$

Subtract:

$$\begin{array}{r} 12. \quad 9\frac{9}{10} \\ \quad 3\frac{1}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 13. \quad 8\frac{5}{12} \\ \quad 3\frac{1}{4} \\ \hline \end{array}$$

14. In a contest Jack jumped $6\frac{3}{4}$ ft. and Bill jumped $5\frac{1}{2}$ ft. Jack jumped ____ ft. farther than Bill.

15. Mrs. Jones weighed her baby in the baby carriage and found it weighed $39\frac{3}{4}$ lb. Then she weighed the carriage alone and found it weighed $16\frac{1}{8}$ lb. How much did the baby weigh?

Progress Test No. 4

Write just the answers to these examples on your paper. Number each answer. (Record your score.)

1. $1\frac{1}{2}$ doz. oranges at 50¢ a dozen will cost _____.

Add: 2. $\begin{array}{r} \$567.98 \\ 43.00 \\ 27.56 \\ 98.97 \\ \hline \end{array}$

3. $\begin{array}{r} 4\frac{5}{6} \\ 3 \\ 2\frac{1}{2} \\ 3\frac{1}{2} \\ \hline \end{array}$

4. $\begin{array}{r} 4\frac{1}{3} \\ 5 \\ 6 \\ 2\frac{1}{4} \\ \hline \end{array}$

5. $\begin{array}{r} \frac{9}{10} \\ \frac{1}{5} \\ \frac{1}{2} \\ \hline \end{array}$

6. $\begin{array}{r} \frac{7}{12} \\ \frac{1}{6} \\ \frac{3}{4} \\ \hline \end{array}$

7. $5300 \overline{)137800}$

8. $4500 \times 253 =$

9. Subtract $6\frac{3}{8}$ from $8\frac{3}{4}$.

10. Subtract $3\frac{1}{3}$ from $5\frac{1}{2}$.

11. Change to mixed numbers, expressing fractions in lowest terms: $\frac{12}{10}$; $\frac{16}{12}$; $\frac{25}{10}$; $\frac{18}{4}$; $\frac{21}{6}$.

12. Find the area of a rectangle $16' \times 12'$.

13. $56 \overline{)2783}$

14. $856 \times 209 =$

15. If an automobile will go 16 miles on 1 gallon of gasoline, how many gallons of gasoline will be needed on a 256-mile trip?

16. At 23¢ a gallon, what is the cost of 16 gal. of gasoline?

17. Ted earned \$10.00 last week. Can you tell him how much money he will have left if he buys a sweater for \$6.98?

18. Find the sum of \$505.05, \$679.84, \$398.25, and \$469.00.

19. From a piece of dress goods containing $25\frac{1}{2}$ yd., the following lengths were cut off: $3\frac{1}{2}$ yd., 8 yd., and $2\frac{3}{4}$ yd. How much material was left in the piece?

Standards: X, 17. Y, 14. Z, 10.

Finding Out What You Know and What You Don't Know

If you get any example wrong on this page, you need practice in that kind of example. You can find on the next page where to get that practice.

TEST I. ADDITION

- | | | | | | |
|---|--|---|--|--|--|
| 1. $\begin{array}{r} 5 \\ 4 \\ 6 \\ 8 \\ 9 \\ 7 \\ 5 \\ \hline \end{array}$ | 2. $\begin{array}{r} \$36.75 \\ 9.82 \\ 3.57 \\ 9.67 \\ .84 \\ \hline \end{array}$ | 3. $\frac{7}{12} + \frac{1}{3} + \frac{1}{2} =$ | 6. $\begin{array}{r} \frac{3}{8} \\ \frac{5}{16} \\ \frac{1}{2} \\ \hline \end{array}$ | 7. $\begin{array}{r} 4\frac{2}{3} \\ 2\frac{1}{2} \\ \hline \end{array}$ | 8. $\begin{array}{r} 6\frac{5}{16} \\ 7\frac{3}{4} \\ 5 \\ 9\frac{3}{8} \\ \hline \end{array}$ |
|---|--|---|--|--|--|

TEST II. SUBTRACTION

- | | | | | | |
|--|--|--|--|--|--|
| 1. $\begin{array}{r} 5000 \\ 3795 \\ \hline \end{array}$ | 2. $\begin{array}{r} \$259.37 \\ 168.59 \\ \hline \end{array}$ | 3. $\begin{array}{r} 3\frac{3}{4} \\ 1\frac{1}{2} \\ \hline \end{array}$ | 4. $\begin{array}{r} \frac{5}{8} \\ \frac{1}{4} \\ \hline \end{array}$ | 5. $\begin{array}{r} 1\frac{2}{16} \\ \frac{1}{2} \\ \hline \end{array}$ | 6. $\begin{array}{r} 4\frac{2}{3} \\ 2\frac{1}{2} \\ \hline \end{array}$ |
|--|--|--|--|--|--|

7. Find the difference between $4\frac{5}{8}$ and $\frac{1}{6}$.

TEST III. MULTIPLICATION

- | | | | | | |
|---|--|---|--|--|---|
| 1. $\begin{array}{r} 79 \\ 8 \\ \hline \end{array}$ | 2. $\begin{array}{r} 69 \\ 85 \\ \hline \end{array}$ | 3. $\begin{array}{r} 468 \\ 98 \\ \hline \end{array}$ | 4. $\begin{array}{r} 497 \\ 635 \\ \hline \end{array}$ | 5. $\begin{array}{r} 467 \\ 509 \\ \hline \end{array}$ | 6. $\begin{array}{r} 537 \\ 6500 \\ \hline \end{array}$ |
|---|--|---|--|--|---|
7. $\begin{array}{r} \$5.76 \\ 14 \\ \hline \end{array}$ 8. What is the area of a rectangle that is 8 ft. wide and 9 ft. long?

TEST IV. DIVISION

- | | | |
|---------------------------|---------------------------|---------------------------|
| 1. $37 \overline{)15136}$ | 2. $29 \overline{)87118}$ | 3. $17 \overline{)12569}$ |
|---------------------------|---------------------------|---------------------------|
4. If a dozen napkins cost \$7.50, one napkin costs ____.
5. At 12¢ each you can get ____ toys for \$3.00.
6. $5600 \overline{)134400}$ 7. $250 \overline{)9500}$

The Practice You Need

This chart will tell you where you can find the kind of practice you need. If you failed Exercise 1 of Test I, the chart tells you to practice Exercises 1 to 8 on page 8. Where does the chart tell you to practice if you failed Exercise 2 of Test I? (It tells you to practice Test V on page 9.)

TEST I	TEST II	TEST III	TEST IV
1. p. 8, Exs. 1-8	1. p. 12, Test IV	1. p. 17, Test I	1. p. 69, Exs. 1-6
2. p. 9, Test V	2. p. 12, Test V	2. p. 17, Test II	2. p. 44, Test II
3. p. 41, Exs. 1-3	3. p. 63, Exs. 6-7	3. p. 17, Test III	3. p. 69, Exs. 1-6
4. p. 61, Exs. 1-3	4. p. 43, Exs. 4-5	4. p. 17, Test IV	4. p. 31
5. p. 61, Exs. 4-9	5. p. 43, Exs. 4-5	5. p. 17, Test V	5. p. 31
6. p. 60, Exs. 2-3	6. p. 88, Test IV	6. p. 17, Test V	6. p. 91
7. p. 82, Exs. a-g	7. p. 63, Exs. 6-7	7. p. 30	7. p. 91
8. p. 87, Exs. 1-4		8. p. 53, Exs. 1-10	

Just for Fun

A man gave a ten-dollar bill in payment for a four-dollar hat. The hat maker had to get the ten-dollar bill changed at the bank. Then he gave the customer the hat and the six dollars change.

Later the bank returned the ten-dollar bill, saying it was counterfeit, and the hat maker had to give the bank ten dollars in good money.

How much did the hat maker lose?

Answer: A hat and ____ dollars.

CHAPTER V

FRACTIONS

Keeping House*



Mrs. Brown went away for two days and left Marie, who is eleven years old, to keep house for her father and two brothers. Marie found many uses for arithmetic in those two days. These are some of the problems she had to work. Can you do them?

1. The first way she used arithmetic was to check over this grocery bill. Marie thought there was a mistake in it. Do you think so? (Dollar signs and cents points are not used in bills.)

Phone: 3680

BENNETT BROS.

537 MAIN ST., HARRISBURG, PA.

Staple and Fancy Groceries

Mrs. A. L. Brown

3/9/29

2 lb. rice @ 12¢	24
$\frac{1}{2}$ doz. oranges @ 60¢	30
$1\frac{1}{2}$ doz. eggs @ 54¢	91
$\frac{1}{4}$ lb. cookies @ 36¢	09
Total	154

Keeping House *

2. Marie's mother told her to cook the meat for two hours and a quarter. She had to have dinner ready by 11:50; so she had to put the meat on the stove at ____.

3. Spinach should boil for 20 minutes. At what time did she have to put the spinach on the stove, so that it would be ready?

4. Potatoes should boil for 25 minutes. At what time did she have to put the potatoes on the stove, so they would be ready?

5. Mrs. Gray came at 9:45 A.M. to do the cleaning. She worked until 3:45 P.M. She charges 50¢ an hour. Do you know how much Marie paid her when she left? (NOTE. Mrs. Gray did not work between 12 M. and 1:00 P.M.) (12 M. means *noon*.)

6. Marie gave her brother a dollar and sent him to the baker's for a half-dozen rolls at 18¢ a dozen, an 8-cent loaf of bread, and a half-dozen sweet buns at 24¢ a dozen. How much change should her brother have brought back?

7. Marie made a new curtain for the kitchen window as a surprise for her mother. The window was $5\frac{1}{2}$ feet high. Marie wanted the curtain just as long as the window. She allowed 2 inches for shrinking, 2 inches for a hem at the bottom, and 2 inches for a hem at the top. How many yards of material did she have to buy?

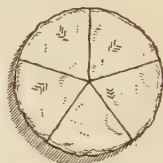
8. Marie canned 18 quart jars of peaches while her mother was away. The peaches cost \$1.80, the sugar \$.65, and she estimated that she had used \$.25 worth of gas to cook the peaches. How much did each jar of the peaches cost? (Marie did not count the cost of the jars because she used some that her mother had in the pantry.)

9. If Marie had bought canned peaches at the store, they would have cost \$2.60 a dozen cans. How much did Marie save on the 18 cans of peaches by canning them herself, instead of buying them already canned at the store?

The Apple Pie

(1) Mrs. Miller baked an apple pie this morning. When Grace and Teddy came home from school, they wanted a piece. She cut the pie into five equal pieces and gave a piece to each. Do you know what part of the pie was left?

(2) Grace received $\frac{1}{5}$ of the pie, and Teddy received $\frac{1}{5}$ of the pie. Together they received $\frac{2}{5}$ of the pie.



(3) How many fifths did the whole pie contain?

(4) How many fifths were left? $\frac{5}{5} - \frac{2}{5} = \frac{3}{5}$

(5) Into how many equal parts is this rectangle divided?

(6) How many sevenths does the whole rectangle contain?



(7) How many sevenths are shaded?

(8) If you cut off the shaded part, how many sevenths are left? $\frac{7}{7} - \frac{1}{7} = \frac{6}{7}$.

1. If you want to subtract $\frac{2}{5}$ from 1, do you see that you must first change the 1 to $\frac{5}{5}$? $1 = \frac{5}{5}$; $\frac{5}{5} - \frac{2}{5} = \frac{3}{5}$.

2. If you want to subtract $\frac{3}{7}$ from 1, you must first change the 1 to $\frac{7}{7}$. $1 = \frac{7}{7}$; $\frac{7}{7} - \frac{3}{7} = \frac{4}{7}$.

3. If you want to subtract $\frac{3}{8}$ from 1, you must first change the 1 to $\frac{8}{8}$. $1 = \frac{8}{8}$; $\frac{8}{8} - \frac{3}{8} = \frac{5}{8}$.

4. If you want to subtract $\frac{7}{10}$ from 1, you must first change the 1 to $\frac{10}{10}$. $1 = \frac{10}{10}$; $\frac{10}{10} - \frac{7}{10} = \frac{3}{10}$.

5. If you want to subtract $\frac{5}{12}$ from 1, you must first change the 1 to $\frac{12}{12}$. $1 = \frac{12}{12}$; $\frac{12}{12} - \frac{5}{12} = \frac{7}{12}$.

6. Subtract each of these fractions from 1.

$\frac{3}{5}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{1}{2}$ $\frac{7}{8}$ $\frac{3}{10}$ $\frac{5}{9}$ $\frac{11}{12}$ $\frac{5}{6}$ $\frac{8}{9}$

7. How much is 1 less $\frac{8}{9}$?

8. What is the difference between $\frac{7}{12}$ and 1?

9. How much more is 1 than $\frac{3}{5}$?

Subtracting Fractions from Whole Numbers

1. If you have 2 pies and eat $\frac{1}{4}$ of a pie, how much pie will be left?

2. Can you tell from this picture how much you will have left if you subtract $\frac{2}{5}$ from 2? $\longrightarrow$



3. Can you tell from this picture how much you will have left if you subtract $\frac{3}{4}$ from 3? $\longrightarrow$



4. Can you tell from this picture how much you will have left if you subtract $\frac{1}{2}$ from 4? $\longrightarrow$



5. Do you see that when we subtract $\frac{2}{5}$ from 2, we think of the 2 as $1\frac{5}{5}$? $1\frac{5}{5} - \frac{2}{5} = 1\frac{3}{5}$.

6. When we subtract $\frac{3}{4}$ from 3, we think of the 3 as ____.
 $2\frac{4}{4} - \frac{3}{4} = ?$

7. When we subtract $\frac{1}{2}$ from 4, we think of the 4 as ____.
 $3\frac{2}{2} - \frac{1}{2} = ?$

8. How would you think of 5 if you want to subtract from it each of the fractions in Exercise 6, page 102?

9. Subtract each of the fractions in Exercise 6, page 102, from 2; from 4; from 6; from 10.

10. Jo started to ride from Rosedale to Millville, a distance of 10 miles. When he came to this sign he said, "I've ridden ____ miles so far."



11. Jean's mother bought a bolt of ribbon containing 5 yd. She gave Jean $\frac{3}{4}$ yd. to tie up a birthday gift for a friend. Jean said, "Now there are only ____ yd. of ribbon left on that bolt."

12. Mrs. Miller bought 8 lb. of sugar. She used $\frac{1}{2}$ lb. in a cake. Then she said, "I'm going to use the remaining ____ lb. to preserve some strawberries."

Learning to Use Mixed Numbers

Tell the missing number in each of these examples :

- | <i>a</i> | <i>b</i> | <i>c</i> |
|---|--------------------------------|--------------------------------|
| 1. $4 = 3\frac{?}{9}$ | $5 = 4\frac{?}{4}$ | $6 = 5\frac{?}{5}$ |
| 2. $7 = 6\frac{?}{8}$ | $12 = 11\frac{?}{5}$ | $13 = 12\frac{?}{8}$ |
| 3. $5 = 4\frac{?}{7}$ | $5 = 4\frac{?}{10}$ | $5 = 4\frac{?}{5}$ |
| 4. $9 = 8\frac{?}{3}$ | $8 = ?\frac{5}{5}$ | $10 = 9\frac{?}{5}$ |
| 5. $4\frac{1}{2} = 3\frac{?}{2}$ (HINT. $4 = 3\frac{2}{2}$; $3\frac{2}{2} + \frac{1}{2} = 3\frac{3}{2}$) | | |
| 6. $5\frac{1}{3} = 4\frac{?}{3}$ (HINT. $5 = 4\frac{3}{3}$; $4\frac{3}{3} + \frac{1}{3} = 4\frac{4}{3}$) | | |
| 7. $3\frac{5}{12} = 2\frac{?}{12}$ (HINT. $3 = 2\frac{12}{12}$; $2\frac{12}{12} + \frac{5}{12} = 2\frac{?}{12}$) | | |
| 8. $8\frac{2}{5} = 7\frac{?}{5}$ (HINT. $8 = 7\frac{5}{5}$; $7\frac{5}{5} + \frac{2}{5} = 7\frac{?}{5}$) | | |
| 9. $5\frac{1}{3} = ?\frac{4}{3}$ | $6\frac{3}{8} = ?\frac{11}{8}$ | $9\frac{6}{7} = ?\frac{13}{7}$ |
| 10. $3\frac{1}{12} = ?\frac{13}{12}$ | $5\frac{5}{8} = ?\frac{13}{8}$ | $4\frac{1}{9} = ?\frac{10}{9}$ |
| 11. Can $\frac{2}{3}$ be subtracted from $\frac{3}{4}$? Think: $\frac{2}{3}$ equals $\frac{?}{12}$; $\frac{3}{4} = \frac{?}{12}$; $\frac{8}{12}$ can be subtracted from $\frac{9}{12}$. | | |

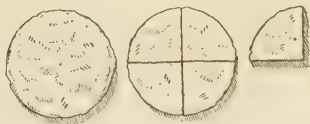
In each of these examples can the second fraction be taken from the first fraction? (Oral.)

- | | | | |
|---------------------------------|--------------------------------|---------------------------------|---------------------------------|
| 12. $\frac{3}{4}, \frac{7}{8}$ | 16. $\frac{5}{6}, \frac{2}{3}$ | 20. $\frac{1}{2}, \frac{5}{8}$ | 24. $\frac{4}{9}, \frac{1}{2}$ |
| 13. $\frac{3}{10}, \frac{1}{5}$ | 17. $\frac{2}{3}, \frac{5}{6}$ | 21. $\frac{1}{2}, \frac{9}{16}$ | 25. $\frac{1}{2}, \frac{5}{6}$ |
| 14. $\frac{5}{12}, \frac{1}{3}$ | 18. $\frac{3}{4}, \frac{2}{5}$ | 22. $\frac{1}{2}, \frac{2}{5}$ | 26. $\frac{3}{8}, \frac{5}{16}$ |
| 15. $\frac{5}{16}, \frac{1}{4}$ | 19. $\frac{3}{4}, \frac{2}{3}$ | 23. $\frac{3}{4}, \frac{5}{8}$ | 27. $\frac{5}{12}, \frac{1}{2}$ |

Mixed Numbers in Subtraction

(1) Mary's mother has $2\frac{1}{4}$ pies. She wants to give Mary and her two little friends each a piece and save the rest for dessert for dinner.

(2) If each of the three girls eats $\frac{1}{4}$ of a pie, what part of a pie will they eat all together?



(3) Can you tell from the picture how much Mary's mother will have left for dinner if each girl eats $\frac{1}{4}$ of a pie?

(4) $2\frac{1}{4} - \frac{3}{4} = ?$ This looks like a hard example because you can't subtract $\frac{3}{4}$ from $\frac{1}{4}$, can you?

(5) Do you see from the picture that you must think of $2\frac{1}{4}$ as $1\frac{5}{4}$ by taking a whole 1 from the 2 and using it as $\frac{4}{4}$?

(6) $1\frac{5}{4} - \frac{3}{4} = ?$

(7) To subtract $\frac{7}{8}$ from $2\frac{5}{8}$ you must think of the $2\frac{5}{8}$ as $1\frac{13}{8}$.

$2\frac{5}{8} = 1\frac{13}{8}$
$\frac{7}{8} = \frac{7}{8}$
$\frac{7}{8} = \frac{7}{8}$
$\frac{7}{8} = \frac{7}{8}$

(8) To subtract $\frac{5}{6}$ from $5\frac{1}{6}$ you must think of the $5\frac{1}{6}$ as $4\frac{7}{6}$.

$5\frac{1}{6} = 4\frac{7}{6}$
$\frac{5}{6} = \frac{5}{6}$
$\frac{5}{6} = \frac{5}{6}$
$\frac{5}{6} = \frac{5}{6}$

(9) To subtract $1\frac{4}{9}$ from 6 you must think of the 6 as $5\frac{9}{9}$.

$6 = 5\frac{9}{9}$
$1\frac{4}{9} = 1\frac{4}{9}$
$1\frac{4}{9} = 1\frac{4}{9}$
$1\frac{4}{9} = 1\frac{4}{9}$

(10) To subtract $\frac{5}{8}$ from $7\frac{1}{4}$ you must first think of the $7\frac{1}{4}$ as $7\frac{2}{8}$. Then you think of $7\frac{2}{8}$ as $6\frac{10}{8}$. $6\frac{10}{8} - \frac{5}{8} = 6\frac{5}{8}$.

$7\frac{1}{4} = 7\frac{2}{8} = 6\frac{10}{8}$
$\frac{5}{8} = \frac{5}{8} = \frac{5}{8}$
$\frac{5}{8} = \frac{5}{8} = \frac{5}{8}$
$\frac{5}{8} = \frac{5}{8} = \frac{5}{8}$

1. If you were subtracting $\frac{7}{8}$ from each of the following numbers, tell how you would think of each.

$6\frac{5}{8}$ $7\frac{3}{8}$ $3\frac{2}{8}$ $8\frac{1}{8}$ $5\frac{4}{8}$ 7 $8\frac{6}{8}$ 9

Do these subtractions:

2. $8\frac{1}{4} - \frac{3}{4}$

3. $9 - \frac{27}{8}$

4. $7\frac{1}{6} - \frac{5}{6}$

5. $9\frac{3}{7} - \frac{6}{7}$

6. $8\frac{4}{9} - \frac{7}{9}$

7. $9\frac{3}{5} - \frac{4}{5}$

Subtracting Mixed Numbers

Do these subtractions:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>
1.	$7 \frac{4}{5}$	$\frac{7}{8} \frac{1}{2}$	$\frac{5}{16} \frac{1}{4}$	$\frac{7}{20} \frac{3}{10}$	$\frac{5}{12} \frac{1}{6}$	$\frac{7}{12} \frac{1}{3}$

2.	$\frac{9}{16} \frac{3}{8}$	$\frac{7}{9} \frac{1}{9}$	$8 \frac{1}{8} \frac{1}{4}$	$7 \frac{1}{4} \frac{1}{2}$	$6 \frac{1}{12} \frac{1}{6}$	$7 \frac{1}{6} \frac{1}{3}$
----	----------------------------	---------------------------	-----------------------------	-----------------------------	------------------------------	-----------------------------

3.	$8 \frac{3}{16} \frac{3}{8}$	$7 \frac{5}{16} \frac{1}{8}$	$6 \frac{5}{12} \frac{1}{6}$	$7 \frac{3}{8}$	$8 \frac{7}{16} \frac{1}{4}$	$9 \frac{5}{8} \frac{1}{2}$
----	------------------------------	------------------------------	------------------------------	-----------------	------------------------------	-----------------------------

4.	$13 \frac{4}{5} \frac{1}{2}$	$16 \frac{3}{10} \frac{1}{5}$	$16 \frac{1}{4} \frac{1}{3}$	$17 \frac{1}{3} \frac{1}{4}$	$8 \frac{1}{2}$	$7 \frac{3}{16} \frac{3}{8}$
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5.	$7 \frac{5}{12} \frac{1}{6}$	$7 \frac{7}{16} \frac{1}{4}$	$8 \frac{1}{12} \frac{1}{4}$	$7 \frac{3}{16} \frac{5}{8}$	$8 \frac{1}{6} \frac{1}{3}$	$9 \frac{3}{4}$
----	------------------------------	------------------------------	------------------------------	------------------------------	-----------------------------	-----------------

6.	$7 \frac{9}{16}$	$8 \frac{1}{2} \frac{7}{2}$	$12 \frac{1}{2} \frac{5}{8}$	$18 \frac{1}{4} \frac{5}{16}$	$17 \frac{3}{8} \frac{11}{16}$	$18 \frac{27}{8}$
----	------------------	-----------------------------	------------------------------	-------------------------------	--------------------------------	-------------------

7. Bertha had a piece of ribbon $4\frac{1}{4}$ yd. long. After using some to make a fancy bag, she found she had $2\frac{7}{8}$ yd. left. Then she knew she had used ____ yd. for the bag.

8. Mr. Alward started out on a 300-mile trip. The first day he drove $148\frac{1}{2}$ miles, and the next day he drove the remaining distance of ____ miles.

Review

$$\begin{array}{r} 1. \ 568 \\ 275 \\ 439 \\ 867 \\ 254 \\ \hline 329 \end{array}$$

$$\begin{array}{r} 2. \ 5 \\ 4 \\ 6 \\ 9 \\ 7 \\ 8 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 3. \ 9 \\ 8 \\ 6 \\ 7 \\ 4 \\ 5 \\ \hline 9 \end{array}$$

$$\begin{array}{r} 4. \ 387630 \\ - 45987 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \ 709 \\ \times 806 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \ 754 \\ \times 3800 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \ 98005 \\ - 76987 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \text{ Add: } 3\frac{5}{8} \\ 4\frac{1}{4} \\ \hline 7 \end{array}$$

$$\begin{array}{r} 9. \text{ Add: } 4\frac{5}{6} \\ 2\frac{1}{3} \\ \hline 1\frac{1}{3} \end{array}$$

$$\begin{array}{r} 10. \text{ Subtract: } 9\frac{7}{8} \\ 3\frac{3}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 11. \text{ Subtract: } 10\frac{1}{2} \\ 3\frac{7}{8} \\ \hline \end{array}$$

$$12. \ 7600 \overline{)266000}$$

$$13. \ 73 \overline{)36015}$$

$$14. \ 72 \overline{)14472}$$

15. By the aid of your ruler find the length and the width of this field.

16. How many square rods does this field contain?

Scale: 1 in. to 32 rd.

17. How many acres does the field contain?

18. What is the perimeter of the field?

Oral Practice for Speed

Find the cost of:

19. $6\frac{1}{2}$ lb. of crackers at 20¢ a pound.

26. $\frac{7}{8}$ lb. at 40¢ a pound.

20. 8 oz. at 36¢ a pound.

27. 27 articles at 3 for 10¢.

21. 10 bananas at 2 for 5¢.

28. 8 articles at 3¢ a dozen.

22. $4\frac{1}{4}$ yd. at 12¢ a yard.

30. A dozen oranges at 3 for 10¢.

23. $2\frac{3}{4}$ yd. at 24¢ a yard.

31. A dozen plums at 4 for 10¢.

24. $2\frac{1}{4}$ doz. at 60¢ a dozen.

32. One quart at 24¢ a gallon.

25. $\frac{2}{3}$ yd. at 24¢ a yard.

33. One foot at 48¢ a yard.

Problems with Mixed Numbers

1. In Snyder's Department Store the price tag on each piece of dress goods contains a space for the clerks to record how much material is left in each piece after each sale. If a clerk sold $2\frac{5}{8}$ yd. from a piece containing $10\frac{3}{4}$ yd., how many yards would she record as being left on that piece?

2. How would the Snyder system save time in a case like the following? A customer asked for $7\frac{1}{2}$ yd. of a certain piece of crêpe de chine. The clerk looked at the tag and found the amount on the piece was $6\frac{7}{8}$ yd.

3. In each of the following cases tell how many yards the clerk should have recorded as left on each piece.

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>
No. of yd. on piece	$12\frac{5}{8}$	$10\frac{7}{8}$	$9\frac{3}{4}$	12	$14\frac{1}{8}$	$15\frac{1}{4}$	$16\frac{1}{2}$	$15\frac{1}{4}$	8
No. of yd. sold	$3\frac{1}{4}$	$2\frac{5}{8}$	$8\frac{7}{8}$	$5\frac{3}{8}$	$2\frac{1}{2}$	$2\frac{7}{8}$	$\frac{7}{8}$	$2\frac{5}{8}$	$\frac{5}{8}$

4. Before Helen went away, she weighed $82\frac{7}{8}$ lb. After she returned, she weighed $86\frac{3}{4}$ lb. How much did she gain in weight?

Subtract:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>
5.	$14\frac{7}{8}$ <u>$12\frac{1}{4}$</u>	$16\frac{5}{12}$ <u>$15\frac{1}{4}$</u>	$29\frac{7}{16}$ <u>$15\frac{1}{4}$</u>	$47\frac{7}{10}$ <u>$35\frac{1}{5}$</u>	$56\frac{7}{10}$ <u>$45\frac{1}{2}$</u>	$78\frac{7}{12}$ <u>$35\frac{1}{3}$</u>
6.	79 <u>$5\frac{3}{8}$</u>	84 <u>$6\frac{5}{8}$</u>	93 <u>$4\frac{5}{16}$</u>	$92\frac{1}{8}$ <u>$17\frac{5}{8}$</u>	$85\frac{3}{16}$ <u>$16\frac{1}{16}$</u>	$79\frac{1}{4}$ <u>$15\frac{7}{8}$</u>
7.	$55\frac{3}{8}$ <u>12</u>	$75\frac{3}{16}$ <u>$29\frac{3}{4}$</u>	$83\frac{7}{10}$ <u>$29\frac{4}{5}$</u>	$76\frac{5}{6}$ <u>$28\frac{1}{4}$</u>	$72\frac{2}{3}$ <u>$25\frac{3}{4}$</u>	$89\frac{2}{3}$ <u>$23\frac{2}{3}$</u>

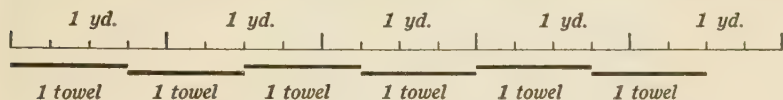
8. Do all the examples 5, 6, and 7 as addition examples.

A Whole Number Times a Fraction

(1) Margaret wished to present her mother with a half-dozen guest towels for Christmas. What would she need to know to decide how much material to buy?

(2) She looked in a catalogue to see how long guest towels are, and decided that $\frac{3}{4}$ yd. of material would be enough to make a towel. Can you find how much material she should buy?

(3) Margaret thought, "For 1 towel I need $\frac{3}{4}$ yd.; so for 6 towels I need $6 \times \frac{3}{4}$ yd." Then she drew this diagram, and dis-



covered that she would need $\frac{18}{4}$ yd., or $4\frac{1}{2}$ yd. Do you see that $6 \times \frac{3}{4}$ yd. = $\frac{18}{4}$ yd. = $4\frac{1}{2}$ yd.?

(4) She paid \$.40 a yard for the material, or \$___ for $4\frac{1}{2}$ yd.

(5) How much material would she need for 8 towels? $8 \times \frac{3}{4} = ?$

Complete each of the following:

$$(6) \begin{cases} 6 \times 3 \text{ fourths} = \text{--- fourths} \\ 6 \times \frac{3}{4} = \frac{?}{4} \end{cases} \quad (10) \begin{cases} 12 \times 2 \text{ thirds} = \text{--- thirds} \\ 12 \times \frac{2}{3} = \frac{?}{?} \end{cases}$$

$$(7) \begin{cases} 10 \times 2 \text{ fifths} = \text{--- fifths} \\ 10 \times \frac{2}{5} = \frac{?}{?} \end{cases} \quad (11) \begin{cases} 8 \times 2 \text{ thirds} = \text{--- thirds} \\ 8 \times \frac{2}{3} = \frac{?}{?} \end{cases}$$

$$(8) \begin{cases} 6 \times 1 \text{ half} = \text{--- halves} \\ 6 \times \frac{1}{2} = \frac{?}{2} \end{cases} \quad (12) \begin{cases} 20 \times 4 \text{ fifths} = \text{--- fifths} \\ 20 \times \frac{4}{5} = \frac{?}{?} \end{cases}$$

$$(9) 6 \times \frac{2}{3} = \frac{?}{?} \quad (13) 20 \times \frac{2}{5} = \frac{?}{?}$$

There is one error in each of these rows. Can you find it?

a	b	c
(14) $8 \times \frac{3}{4} = \frac{24}{4} = 6$	$8 \times \frac{3}{5} = \frac{24}{5} = 4\frac{4}{5}$	$8 \times \frac{2}{3} = \frac{16}{3} = 5\frac{2}{3}$
(15) $10 \times \frac{3}{4} = \frac{30}{4} = 7\frac{1}{2}$	$10 \times \frac{3}{5} = \frac{30}{5} = 6$	$10 \times \frac{7}{8} = \frac{60}{8} = 7\frac{1}{2}$
(16) $12 \times \frac{2}{3} = \frac{24}{3} = 8$	$12 \times \frac{3}{16} = \frac{36}{16} = 2\frac{1}{4}$	$12 \times \frac{3}{2} = \frac{36}{2} = 18$
(17) $7 \times \frac{2}{3} = \frac{14}{3} = \frac{2}{3}$	$9 \times \frac{2}{5} = \frac{18}{5} = 3\frac{3}{5}$	$4 \times \frac{5}{9} = \frac{20}{9} = 2\frac{2}{9}$

A Whole Number Times a Fraction

Bright pupils always try to make up rules for arithmetic. Look at this example and see if you can make a rule for finding a whole number times a fraction. Robert made this rule for finding a whole number times a fraction.

$$6 \times \frac{3}{4} = \frac{18}{4} = 4\frac{1}{2}$$

A whole number times a fraction equals the whole number times the numerator, divided by the denominator.

Do you like his rule? Does it fit the example above?

Use Robert's rule to do these multiplications: (The result should be expressed as a mixed number, if possible.)

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
1. $5 \times \frac{2}{7}$	$5 \times \frac{3}{7}$	$5 \times \frac{4}{7}$	$5 \times \frac{5}{7}$	$5 \times \frac{2}{5}$
2. $6 \times \frac{2}{3}$	$6 \times \frac{2}{4}$	$6 \times \frac{2}{5}$	$6 \times \frac{4}{6}$	$6 \times \frac{5}{6}$
3. $10 \times \frac{3}{4}$	$10 \times \frac{1}{5}$	$10 \times \frac{3}{12}$	$10 \times \frac{7}{8}$	$10 \times \frac{3}{10}$
4. $12 \times \frac{3}{4}$	$12 \times \frac{2}{3}$	$12 \times \frac{5}{6}$	$12 \times \frac{4}{5}$	$12 \times \frac{7}{12}$
5. $50 \times \frac{3}{4}$	$60 \times \frac{7}{8}$	$70 \times \frac{2}{3}$	$80 \times \frac{3}{7}$	$90 \times \frac{2}{3}$

6. If you need $\frac{2}{3}$ of a yard of material for one curtain, how much material do you need for 6 curtains of the same size?

7. If $\frac{1}{4}$ in. on a drawing represents a distance of 1 foot, how long a line would you have to draw to represent 4 ft.? 8 ft.? 12 ft.?

8. If $\frac{5}{8}$ in. on a drawing represents a distance of 1 mile, how long a line would you have to draw to represent 2 mi.? 6 mi.? 16 mi.?

9. Marie practices her music lesson $\frac{3}{4}$ hr. every day. How many hours of practicing does she do in a week? in a month of 30 days?

10. Mrs. Smith's chocolate-cake recipe calls for $\frac{5}{6}$ of a cup of milk. She is making 5 cakes for a festival. How many cups of milk does she need?

A Whole Number Times a Mixed Number

(1) Six girls in the fifth grade decided to make aprons to wear in their cooking class. They wondered how much material they should buy for all the aprons. What would they need to know in order to decide? Their household-arts teacher told them to allow $2\frac{3}{4}$ yd. of material for each apron.

(2) Then they thought: For one apron we need $2\frac{3}{4}$ yd.; for 6 aprons we need $6 \times 2\frac{3}{4}$ yd.; now $6 \times 2\frac{3}{4}$ yd. is 6×2 yd. $+ 6 \times \frac{3}{4}$ yd.; 6×2 yd. = 12 yd.; $6 \times \frac{3}{4}$ yd. = $4\frac{1}{2}$ yd.; 12 yd. $+ 4\frac{1}{2}$ yd. = $16\frac{1}{2}$ yd. So $6 \times 2\frac{3}{4}$ yd. = $16\frac{1}{2}$ yd.

(3) How many yards of material did the girls need?

(4) Notice how the example is written here. Cover the work and then see whether you can do it by yourself.

$2\frac{3}{4}$	
$\times 6$	
12	$(6 \times 2 = 12)$
$4\frac{1}{2}$	$(6 \times \frac{3}{4} = 4\frac{1}{2})$
$16\frac{1}{2}$	

1. How many yards of material would be needed to make 6 dresses if $2\frac{1}{2}$ yards are needed for 1 dress? (Write the example as shown in the box.)

2. These multiplication examples are done correctly. Examine each one carefully. Then cover the work and see if you can do them.

<i>a.</i> $3\frac{3}{4}$	<i>b.</i> $6\frac{2}{3}$	<i>c.</i> $8\frac{1}{3}$	<i>d.</i> $12\frac{1}{2}$	<i>e.</i> $6\frac{1}{4}$	<i>f.</i> $12\frac{7}{8}$
$\frac{8}{24}$	$\frac{9}{54}$	$\frac{10}{80}$	$\frac{6}{72}$	$\frac{9}{54}$	$\frac{9}{108}$
$\frac{6}{30}$	$\frac{6}{60}$	$\frac{3\frac{1}{3}}{83\frac{1}{3}}$	$\frac{3}{75}$	$\frac{2\frac{1}{4}}{56\frac{1}{4}}$	$\frac{7\frac{7}{8}}{115\frac{7}{8}}$

3. Can you find the 3 errors in these multiplication examples?

<i>a.</i> $2\frac{3}{4}$	<i>b.</i> $1\frac{7}{8}$	<i>c.</i> $3\frac{2}{5}$	<i>d.</i> $12\frac{5}{8}$	<i>e.</i> $16\frac{2}{3}$	<i>f.</i> $12\frac{1}{2}$
$\frac{7}{14}$	$\frac{5}{5}$	$\frac{6}{18}$	$\frac{10}{120}$	$\frac{6}{96}$	$\frac{8}{96}$
$\frac{5\frac{1}{4}}{19\frac{1}{4}}$	$\frac{4\frac{3}{8}}{9\frac{3}{8}}$	$\frac{2\frac{3}{5}}{20\frac{3}{5}}$	$\frac{6\frac{1}{8}}{126\frac{1}{8}}$	$\frac{4}{100}$	$\frac{8}{104}$

Fractions

Do these multiplications:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
1.	$6 \times 3\frac{1}{2}$	$6 \times 3\frac{3}{4}$	$6 \times 3\frac{7}{8}$	$6 \times 3\frac{15}{16}$	$6 \times 3\frac{31}{32}$
2.	$12 \times 3\frac{1}{4}$	$12 \times 3\frac{1}{3}$	$12 \times 3\frac{1}{2}$	$12 \times 3\frac{2}{3}$	$12 \times 3\frac{5}{6}$
3.	$24 \times 4\frac{1}{8}$	$24 \times 4\frac{1}{6}$	$24 \times 4\frac{1}{3}$	$24 \times 4\frac{1}{2}$	$24 \times 4\frac{5}{6}$
4.	$15 \times 6\frac{2}{3}$	$16 \times 6\frac{1}{4}$	$40 \times 2\frac{1}{2}$	$33 \times 3\frac{1}{3}$	$30 \times 3\frac{2}{3}$
5.	$300 \times 3\frac{1}{3}$	$400 \times 2\frac{1}{2}$	$600 \times 1\frac{2}{3}$	$800 \times 1\frac{1}{4}$	$150 \times 3\frac{1}{3}$
6.	$144 \times 8\frac{1}{4}$	$288 \times 4\frac{1}{8}$	$160 \times 16\frac{1}{4}$	$175 \times 2\frac{1}{4}$	$324 \times 6\frac{2}{3}$

7. A rectangle is $6\frac{5}{8}$ ft. wide and 16 ft. long. What is the area?

8. Find the cost of eight handkerchiefs at $12\frac{1}{2}\text{¢}$ each.

9. Find the cost of four collars at $37\frac{1}{2}\text{¢}$ each.

10. Find the cost of 600 sheets of paper at $1\frac{1}{4}\text{¢}$ a sheet.

11. Find the cost of 500 pen points at $1\frac{1}{2}\text{¢}$ each.

12. Mrs. Reed needs $2\frac{3}{4}$ lb. of meat for a meat pie. How many pounds of meat does she need for the 5 meat pies she plans to make for the church supper?

13. It takes $2\frac{3}{8}$ yd. of material for a bungalow apron. How much material would you have to buy for 8 bungalow aprons?

14. At $37\frac{1}{2}\text{¢}$ a yard what is the cost of the 19 yd. of material for the 8 bungalow aprons?

15. If you need $2\frac{7}{8}$ yd. of material for one pair of curtains, how many yards would you need to buy for 8 pairs of curtains of the same size?

16. At $62\frac{1}{2}\text{¢}$ a yard what is the cost of the 23 yd. of material for the 8 pairs of curtains?

17. A 90-cent box of salted nuts contains $1\frac{3}{16}$ lb. of nuts. How many pounds of nuts could you get for \$2.70?

A Fraction Times a Whole Number

1. George picked cherries for his uncle. He got $\frac{3}{8}$ of the cherries. One day he picked 16 quarts. Can you tell how many quarts George kept for his share?

George thought : $\frac{1}{8}$ of 16 qt. is 2 qt. ; so $\frac{3}{8}$ of 16 qt. is 3×2 qt., or 6 qt.

2. What is $\frac{3}{4}$ of 24? Think : $\frac{1}{4}$ of 24 is 6 ; so $\frac{3}{4}$ of 24 is 3×6 , or ____.

3. Find $\frac{3}{8}$ of 32. Think : $\frac{1}{8}$ of 32 is 4 ; so $\frac{3}{8}$ of 32 is 3×4 , or ____.

4. What is $\frac{3}{8}$ of 40? $\frac{4}{5}$ of 20? $\frac{2}{3}$ of 36? $\frac{7}{8}$ of 16?

5. What is the cost of (a) $\frac{3}{4}$ lb. candy at 60 cents a pound?
(b) $\frac{3}{4}$ yd. silk at \$2 a yard? (c) $\frac{7}{8}$ lb. cheese at 32 cents a pound?

6. Can you find $\frac{2}{3}$ of 5?

Think : $\frac{1}{3}$ of 5 is $1\frac{2}{3}$; so $\frac{2}{3}$ of 5 is $2 \times 1\frac{2}{3}$, or $3\frac{1}{3}$.

7. What is $\frac{2}{3}$ of 7? $\frac{2}{3}$ of 8? $\frac{2}{3}$ of 10? $\frac{2}{3}$ of 13? $\frac{2}{3}$ of 14?

8. Complete : To find $\frac{3}{4}$ of 9 I think : $\frac{1}{4}$ of 9 is ____ ; so $\frac{3}{4}$ of 9 is $3 \times$ ____, or ____.

9. Complete : To find $\frac{3}{5}$ of 18 I think : $\frac{1}{5}$ of 18 is ____ ; so $\frac{3}{5}$ of 18 is $3 \times$ ____, or ____.

10. If gingham costs 42¢ a yard, how much will $\frac{3}{8}$ yd. cost? Think : $\frac{1}{8}$ yd. will cost $\frac{1}{8}$ of 42¢, or ____ ; so $\frac{3}{8}$ yd. will cost $3 \times 5\frac{1}{4}$, or ____.

11. If velvet costs \$3.45 a yard, how much will $\frac{5}{8}$ yd. cost? Think : $\frac{1}{8}$ yd. will cost $\frac{1}{8}$ of \$3.45, or ____ ; so $\frac{5}{8}$ yd. will cost $5 \times \$43\frac{1}{8}$, or ____.

12. Find the cost of 7 oz. of meat at 49¢ a pound.

Multiplying Fractions

(1) Here is a chocolate bar that Alice bought. It is marked off into eight squares. Each square is one ____ of the chocolate bar.

(2) Alice gave half the bar to Mary. Mary got ____ eighths. Mary gave Doris $\frac{3}{4}$ of her half. Doris got ____ eighths. $\frac{3}{4}$ of $\frac{1}{2} = \frac{3}{8}$.



(3) Frank had a chocolate bar and gave Arthur $\frac{3}{4}$ of it. Arthur gave $\frac{1}{2}$ of his $\frac{3}{4}$ to John. Can you tell what part of the bar John got? $\frac{1}{2}$ of $\frac{3}{4} = \frac{3}{8}$.

(4) Sometimes, instead of saying " $\frac{1}{2}$ of $\frac{3}{4}$," we say " $\frac{1}{2}$ times $\frac{3}{4}$." That is, $\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$.

$\frac{1}{2}$ of $\frac{3}{4}$ is the same as $\frac{1}{2} \times \frac{3}{4}$

(5) Here is a line divided into twelfths:



Beginning at A , to what letter does $\frac{2}{3}$ of the line go?

What letter shows $\frac{3}{4}$ of the way from A to I ?

From A to G is how many twelfths of the line?

$$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$$

Notice that $\frac{3 \times 2}{4 \times 3} = \frac{6}{12}$
and that $\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$

In multiplying fractions multiply the numerators, then multiply the denominators.

(6) To find $\frac{3}{4}$ of $\frac{1}{2}$ (that is, $\frac{3}{4} \times \frac{1}{2}$), think, " $3 \times 1 = 3$." Write 3 for the numerator. " $4 \times 2 = 8$." Write 8 for the denominator. $\frac{3}{4}$ of $\frac{1}{2} = \frac{3}{8}$. That is, $\frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$.

(7) Is $\frac{1}{2} \times \frac{3}{4}$ the same as $\frac{3}{4} \times \frac{1}{2}$? What does each equal?

Multiplying Fractions

There is at least one example incorrect in each one of the first five rows. Can you find the errors?

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $\frac{2}{3} \times \frac{1}{5} = \frac{2}{15}$	$\frac{1}{2}$ of $\frac{5}{6} = \frac{5}{12}$	$\frac{3}{8} \times \frac{3}{4} = \frac{9}{32}$	$\frac{5}{6} \times \frac{2}{3} = \frac{10}{18}$
2. $\frac{3}{4} \times \frac{3}{7} = \frac{9}{28}$	$\frac{1}{4}$ of $\frac{1}{6} = \frac{1}{24}$	$\frac{3}{5} \times \frac{2}{7} = \frac{6}{35}$	$\frac{4}{3} \times \frac{3}{2} = \frac{12}{6}$
3. $\frac{4}{5} \times \frac{2}{3} = \frac{8}{15}$	$\frac{1}{6}$ of $\frac{2}{3} = \frac{2}{18}$	$\frac{2}{3} \times \frac{2}{5} = \frac{4}{15}$	$\frac{7}{8} \times \frac{1}{3} = \frac{7}{24}$
4. $\frac{2}{5} \times \frac{1}{5} = \frac{2}{5}$	$\frac{3}{4}$ of $\frac{1}{2} = \frac{3}{8}$	$\frac{1}{3} \times \frac{7}{12} = \frac{7}{36}$	$\frac{3}{4} \times \frac{7}{8} = \frac{21}{32}$
5. $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$	$\frac{3}{5}$ of $\frac{1}{7} = \frac{3}{35}$	$\frac{5}{8} \times \frac{3}{10} = \frac{15}{80}$	$\frac{2}{3} \times \frac{5}{7} = \frac{10}{21}$

Do these multiplications:

6. $\frac{1}{2}$ of $\frac{5}{6}$	$\frac{1}{7} \times \frac{2}{3}$	$\frac{6}{9} \times \frac{3}{2}$	$\frac{1}{8} \times \frac{3}{5}$
7. $\frac{3}{4}$ of $\frac{2}{3}$	$\frac{1}{8} \times \frac{2}{5}$	$\frac{4}{5} \times \frac{5}{4}$	$\frac{3}{8} \times \frac{1}{5}$
8. $\frac{1}{6}$ of $\frac{1}{2}$	$\frac{3}{8} \times \frac{2}{5}$	$\frac{1}{2} \times \frac{7}{9}$	$\frac{7}{10} \times \frac{3}{4}$
9. $\frac{3}{8}$ of $\frac{1}{4}$	$\frac{2}{9} \times \frac{2}{3}$	$\frac{3}{4} \times \frac{5}{6}$	$\frac{5}{7} \times \frac{2}{3}$
10. $\frac{1}{4}$ of 12	$\frac{2}{5}$ of 15	$\frac{5}{6}$ of 12	$\frac{2}{5}$ of 10
11. $\frac{3}{4}$ of 12	$\frac{3}{5}$ of 15	$\frac{1}{3}$ of 9	$\frac{3}{5}$ of 10
12. $\frac{1}{2}$ of 6	$\frac{4}{5}$ of 15	$\frac{2}{3}$ of 9	$\frac{1}{4}$ of 16
13. $\frac{1}{5}$ of 15	$\frac{1}{6}$ of 12	$\frac{1}{5}$ of 10	$\frac{3}{4}$ of 16
14. $\frac{1}{4} \times 24$	$\frac{2}{9} \times 54$	$\frac{1}{8} \times 72$	$\frac{1}{7} \times 49$
15. $\frac{1}{6} \times 24$	$\frac{1}{6} \times 48$	$\frac{3}{8} \times 72$	$\frac{2}{7} \times 49$
16. $\frac{1}{9} \times 54$	$\frac{1}{9} \times 72$	$\frac{5}{8} \times 72$	$\frac{3}{7} \times 49$

Cancellation

(1) Mary had this example in school. She did it this way: $\frac{3}{4} \times \frac{1}{6} = \frac{3}{24} = \frac{1}{8}$. Is her work correct? $\frac{3}{4} \times \frac{1}{6} =$

(2) She showed her work to her brother, Donald, and he said, "I know an easier way to do that example. My way is shorter and gives smaller numbers to work with." This is the way he

did it: $\frac{1}{4} \times \frac{1}{\underset{2}{6}} = \frac{1}{8}$. Do you understand what he did?

(3) He saw that the 3 in a numerator and the 6 in a denominator of the fractions he was multiplying could both be divided by 3. He thought, "3 in 3, 1 time." He crossed off the 3 and wrote the 1 above it. He thought, "3 in 6, 2 times." He crossed off the 6 and wrote the 2 under it. Then he thought of his example as $\frac{1}{4} \times \frac{1}{2}$. What does $\frac{1}{4} \times \frac{1}{2}$ equal?

(4) Henry had $\frac{2}{5}$ of a bar of chocolate. He gave $\frac{1}{2}$ of it to Martha. What part of a bar of chocolate did he give to Martha? Can you work this problem the way Donald worked the example above?

(5) Is this work correct? $\frac{1}{\underset{1}{2}} \times \frac{\overset{1}{2}}{5} = \frac{1}{5}$

*When fractions are multiplied, a numerator and a denominator may be divided by the same number. This is called **cancellation**.*

In each of these examples tell by what number or numbers a numerator and denominator are both divided.

1. $\frac{\overset{1}{5}}{6} \times \frac{1}{\underset{1}{5}} = \frac{1}{6}$

2. $\frac{\overset{1}{5}}{\underset{4}{8}} \times \frac{\overset{1}{2}}{\underset{1}{5}} = \frac{1}{4}$

3. $5 \times \frac{3}{5} = \frac{1}{1} \times \frac{\overset{1}{3}}{\underset{1}{5}} = 3$

4. $\frac{3}{8} \times 4 = \frac{3}{\underset{2}{8}} \times \frac{\overset{1}{4}}{1} = \frac{3}{2} = 1\frac{1}{2}$

More Cancellation .

Multiply, canceling wherever possible: (In some examples you can cancel twice, as in Example 2, page 116.)

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $\frac{2}{3} \times \frac{1}{4}$	$\frac{2}{3} \times \frac{4}{5}$	$\frac{20}{1} \times \frac{2}{5}$	$\frac{16}{1} \times \frac{5}{6}$
2. $\frac{7}{10} \times \frac{2}{5}$	$\frac{3}{4} \times 12$	$\frac{5}{6} \times \frac{15}{40}$	$\frac{24}{1} \times \frac{2}{9}$
3. $\frac{3}{16} \times \frac{2}{3}$	$\frac{2}{5} \times 20$	$\frac{10}{12} \times \frac{3}{5}$	$\frac{3}{4} \times \frac{32}{33}$
4. $\frac{5}{16} \times \frac{4}{5}$	$\frac{5}{6} \times 16$	$\frac{6}{18} \times \frac{3}{4}$	$\frac{5}{8} \times 48$
5. $\frac{5}{12} \times \frac{3}{8}$	$\frac{7}{8} \times 16$	$\frac{5}{9} \times \frac{18}{20}$	$\frac{3}{4} \times 40$
6. $\frac{5}{12} \times \frac{1}{4}$	$\frac{3}{4} \times 24$	$\frac{2}{3} \times \frac{11}{12}$	$\frac{5}{9} \times \frac{2}{3}$
7. $\frac{5}{6} \times \frac{1}{4}$	$\frac{7}{12} \times 30$	$\frac{8}{9} \times \frac{27}{1}$	$\frac{2}{12} \times \frac{3}{5}$
8. $\frac{5}{6} \times \frac{2}{2}$	$\frac{3}{5} \times \frac{5}{6}$	$28 \times \frac{4}{7}$	$21 \times \frac{4}{7}$

Be sure to notice whether you are to add, subtract, or multiply in Examples 9 to 14.

9. $\frac{1}{2} + \frac{1}{4}$	$\frac{2}{3} + \frac{1}{3}$	$\frac{4}{5} + \frac{3}{4}$	$\frac{7}{10} + \frac{2}{5}$
10. $\frac{1}{2} - \frac{1}{4}$	$\frac{2}{3} - \frac{1}{3}$	$\frac{4}{5} - \frac{3}{4}$	$\frac{7}{10} - \frac{2}{5}$
11. $\frac{1}{2} \times \frac{1}{4}$	$\frac{2}{3} \times \frac{1}{3}$	$\frac{4}{5} \times \frac{5}{8}$	$\frac{7}{10} \times \frac{2}{5}$
12. $\frac{2}{3} + \frac{1}{4}$	$\frac{5}{6} + \frac{2}{5}$	$\frac{2}{3} + \frac{3}{5}$	$\frac{1}{2} + \frac{3}{8}$
13. $\frac{2}{3} - \frac{1}{4}$	$\frac{5}{6} - \frac{2}{5}$	$\frac{2}{3} - \frac{3}{5}$	$\frac{1}{2} - \frac{3}{8}$
14. $\frac{2}{3} \times \frac{1}{4}$	$\frac{5}{6} \times \frac{2}{5}$	$\frac{2}{3} \times \frac{3}{5}$	$\frac{1}{2} \times \frac{3}{8}$

15. Alice has $\frac{2}{3}$ of an apple. If she shares it equally with her sister, what part of the apple will each get?

A Fraction Times a Whole Number

(1) James, a fifth-grade boy, wished to find $\frac{7}{8}$ of 30. Can you do it?

(2) He did it this way: $\frac{1}{8}$ of 30 = $3\frac{3}{4}$; so $\frac{7}{8}$ of 30 = $7 \times 3\frac{3}{4}$, or $26\frac{1}{4}$.

(3) His sister, Grace, who was in the sixth grade, said: "I do examples like that this way: $\frac{7}{8}$ of 30 = $\frac{7 \times 30}{8} = \frac{210}{8} = 26\frac{1}{4}$. Isn't that easier? You see, *you* multiply *after* you divide, but I multiply *before* I divide."

(4) See if you can find $\frac{7}{8}$ of 20 by Grace's way.

(5) There are 2 errors in these multiplications. Can you find them?

$$\frac{7}{8} \text{ of } 40 = \frac{7 \times 40}{8} = \frac{280}{8} = 35$$

$$\frac{5}{16} \text{ of } 20 = \frac{5 \times 20}{16} = \frac{100}{16} = 6\frac{1}{2}$$

$$\frac{4}{5} \text{ of } 24 = \frac{4 \times 24}{5} = \frac{96}{5} = 19\frac{1}{5}$$

$$\frac{5}{8} \text{ of } 20 = \frac{5 \times 20}{8} = \frac{100}{8} = 12\frac{1}{2}$$

Do these multiplications:

1. $\frac{2}{3}$ of 20

5. $\frac{3}{4}$ of 27

9. $\frac{4}{5}$ of 9

13. $\frac{5}{6}$ of 10

2. $\frac{3}{8}$ of 14

6. $\frac{3}{16}$ of 30

10. $\frac{5}{16}$ of 40

14. $\frac{7}{16}$ of 50

3. $\frac{1}{6}$ of 100

7. $\frac{2}{3}$ of 100

11. $\frac{5}{6}$ of 100

15. $\frac{3}{8}$ of 100

4. $\frac{5}{8}$ of 100

8. $\frac{7}{8}$ of 100

12. $\frac{2}{3}$ of 1000

16. $\frac{5}{6}$ of 1000

Can you find an error in these examples?

17. $\frac{5}{4}$ of 25 = $\frac{125}{4} = 31\frac{1}{4}$

19. $\frac{5}{3}$ of 20 = $\frac{100}{3} = 33\frac{1}{3}$

18. $\frac{7}{2} \times 5 = \frac{35}{2} = 17\frac{1}{2}$

20. $\frac{5}{2} \times 7 = \frac{35}{2} = 17\frac{1}{2}$

Do these examples:

21. $\frac{5}{6} \times 27$

23. $\frac{4}{5} \times 15$

25. $\frac{3}{4} \times 26$

27. $\frac{7}{8} \times 50$

22. $20 \times \frac{3}{8}$

24. $35 \times \frac{3}{10}$

26. $55 \times \frac{4}{15}$

28. $27 \times \frac{5}{12}$

Changing Mixed Numbers to Improper Fractions

- (1) This picture shows that $\frac{5}{3} = 1\frac{2}{3}$.



- (2) How can you find without the use of a picture that $\frac{5}{3} = 1\frac{2}{3}$?

- (3) This picture shows that $1\frac{2}{3} = \frac{5}{3}$.



- (4) Do you know of any way, without the use of a picture, to find that $1\frac{2}{3} = \frac{5}{3}$?

- (5) Does $1 = \frac{3}{3}$? Then $1\frac{2}{3}$ must equal $\frac{3}{3} + \frac{2}{3}$, or $\frac{5}{3}$.

- (6) In changing $2\frac{8}{9}$ to an improper fraction, we remember that $1 = \frac{9}{9}$; so we can think of the 2 as $\frac{18}{9}$. Then $2\frac{8}{9}$ is equal to $\frac{18}{9} + \frac{8}{9}$, or $\frac{26}{9}$.

To change a mixed number to an improper fraction, first multiply the whole number by the denominator, then to the product add the numerator and place this sum over the denominator.

1. Using the rule to change $4\frac{5}{8}$ to an improper fraction, think :

$$8 \times 4 = ? \quad 32 + 5 = ? \quad \text{The improper fraction is } \frac{37}{8}.$$

2. Using the rule to change $2\frac{5}{7}$ to an improper fraction, think :

$$7 \times 2 = ? \quad 14 + 5 = ? \quad \text{The improper fraction is } \frac{29}{7}.$$

Change these mixed numbers to improper fractions:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>
3.	$2\frac{2}{3}$	$7\frac{2}{9}$	$2\frac{1}{2}$	$9\frac{3}{5}$	$8\frac{5}{8}$	$3\frac{1}{7}$	$6\frac{3}{8}$	$9\frac{4}{7}$
4.	$5\frac{4}{5}$	$8\frac{3}{4}$	$3\frac{5}{6}$	$2\frac{3}{8}$	$4\frac{3}{10}$	$4\frac{2}{5}$	$4\frac{1}{5}$	$2\frac{3}{5}$
5.	$6\frac{3}{8}$	$6\frac{2}{3}$	$8\frac{4}{7}$	$4\frac{1}{7}$	$6\frac{5}{9}$	$8\frac{1}{3}$	$6\frac{3}{7}$	$9\frac{3}{4}$

A Fraction Times a Mixed Number

Miriam shelled $2\frac{1}{4}$ lb. of nuts for her mother when she was doing the Christmas baking. Her mother said, "I'll take $\frac{3}{4}$ of those nuts for this nut cake." Miriam thought: "How much is $\frac{3}{4}$ of $2\frac{1}{4}$ lb.?"

$$(\frac{3}{4} \text{ of } 2\frac{1}{4} = ?)$$

"If that were $\frac{3}{4}$ of a *fraction*, I could easily find out, because I know how to find $\frac{3}{4}$ of a fraction. I'll change the $2\frac{1}{4}$ to $\frac{9}{4}$ and then multiply; $\frac{3}{4} \times \frac{9}{4} = \frac{27}{16} = 1\frac{11}{16}$." She gave her mother $1\frac{11}{16}$ lb. of the nuts; that is, 1 lb. ____ oz.

Do you understand the next two examples?

$$(1) \frac{3}{8} \times 1\frac{2}{3} = \frac{\overset{1}{\cancel{3}}}{8} \times \frac{5}{\underset{1}{\cancel{3}}} = \frac{5}{8} \qquad (2) \frac{5}{8} \times 2\frac{3}{5} = \frac{\overset{1}{\cancel{5}}}{8} \times \frac{13}{\underset{1}{\cancel{5}}} = \frac{13}{8} = 1\frac{5}{8}$$

To multiply a mixed number by a fraction, change the mixed number to an improper fraction and multiply.

Multiply: (Change all answers to mixed numbers or whole numbers if possible.)

a	b	c	d	e
1. $\frac{3}{4} \times 5\frac{1}{2}$	$\frac{3}{8} \times 1\frac{1}{6}$	$2\frac{2}{3} \times \frac{3}{4}$	$\frac{4}{9} \times 2\frac{1}{4}$	$\frac{5}{6} \times 2\frac{3}{8}$
2. $\frac{7}{8} \times 2\frac{3}{4}$	$2\frac{3}{4} \times \frac{3}{5}$	$4\frac{1}{5} \times \frac{1}{7}$	$3\frac{1}{6} \times \frac{2}{3}$	$6\frac{1}{3} \times \frac{2}{3}$

3. Mrs. Gray wants $7\frac{1}{2}$ yd. of gingham at $33\frac{1}{3}\text{¢}$ a yard. How much money does she need?

$$7\frac{1}{2} \times 33\frac{1}{3}\text{¢} = \frac{\overset{5}{\cancel{15}}}{2} \times \frac{\overset{50}{\cancel{100}}}{\underset{1}{\cancel{3}}}\text{¢} = 250\text{¢} = \$2.50$$

To multiply a mixed number by a mixed number, change each of the mixed numbers to an improper fraction and multiply.

4. $1\frac{1}{2} \times 1\frac{1}{4}$	$3\frac{1}{3} \times 5\frac{5}{8}$	$4\frac{4}{9} \times 7\frac{1}{5}$	$2\frac{1}{4} \times 3\frac{1}{4}$	$5\frac{3}{8} \times \frac{4}{5}$
5. $4\frac{1}{2} \times 2\frac{1}{4}$	$7\frac{2}{9} \times 3\frac{3}{5}$	$4\frac{1}{2} \times 2\frac{1}{2}$	$4\frac{1}{5} \times 2\frac{1}{7}$	$2\frac{1}{2} \times 2\frac{1}{2}$

A Mixed Number Times a Whole Number

- (1) A hotel bought $4\frac{2}{3}$ doz. sheets at \$18 a dozen. To find how much the sheets cost, we must multiply \$18 by $4\frac{2}{3}$.

$$\begin{array}{r} \$18 \\ 4\frac{2}{3} \\ \hline 72 \\ 12 \\ \hline \$84 \end{array}$$

To multiply a whole number by a mixed number, first multiply the whole number by the whole-number part of the mixed number and next multiply by the fraction. Then add. (How much did $4\frac{2}{3}$ doz. sheets cost?)

- (2) Can you find two mistakes in these multiplications?

a. 26

$$\begin{array}{r} 3\frac{2}{3} \\ 78 \\ 17\frac{1}{3} \\ \hline 95\frac{1}{3} \end{array}$$

b. 72

$$\begin{array}{r} 3\frac{2}{9} \\ 216 \\ 16 \\ \hline 222 \end{array}$$

c. 36

$$\begin{array}{r} 3\frac{2}{5} \\ 108 \\ 14\frac{2}{5} \\ \hline 122\frac{2}{5} \end{array}$$

d. 28

$$\begin{array}{r} 5\frac{3}{4} \\ 140 \\ 21 \\ \hline 350 \end{array}$$

- (3) Some persons prefer to multiply a whole number by a mixed number as is done in this box. Do you see what has been done? First the mixed number is changed to a fraction, and the whole number is made into a fraction by writing it over 1. Then the two fractions are multiplied in the usual way.

$$\begin{array}{l} 4\frac{2}{3} \times 18 \\ \quad \quad \quad 6 \\ \frac{14}{3} \times \frac{18}{1} = 84 \text{ (dollars)} \\ \quad \quad \quad 1 \end{array}$$

Here are two illustrations to help you learn the method:

(a) $3\frac{2}{3} \times 26 =$

(b) $5\frac{3}{4} \times 28 =$

$$\frac{11}{3} \times \frac{26}{1} = \frac{286}{3} = 95\frac{1}{3}$$

$$\frac{23}{4} \times \frac{28}{1} = 161$$

Do these multiplications by the method you prefer:

- | a | b | c | d |
|---------------------------------|------------------------------|------------------------------|------------------------------|
| 1. $4\frac{1}{4} \times 16$ | $2\frac{2}{3} \times 15$ | $4\frac{1}{6} \times 12$ | $5\frac{3}{8} \times 16$ |
| 2. $5\frac{2}{3} \times 12$ | $4\frac{1}{4} \times 12$ | $3\frac{5}{12} \times 6$ | $8\frac{4}{8} \times 24$ |
| 3. $5\frac{2}{9} \times 18$ | $16\frac{1}{3} \times 12$ | $15\frac{3}{8} \times 32$ | $16\frac{3}{9} \times 36$ |
| 4. $2\frac{3}{8} \times \$1.75$ | $3\frac{3}{4} \times \$1.98$ | $2\frac{7}{8} \times \$2.25$ | $4\frac{3}{4} \times \$1.49$ |

A Mixed Number Times a Fraction

1. Jane's fudge recipe calls for $\frac{3}{8}$ cup of melted chocolate. She wants to make $2\frac{1}{2}$ times as much fudge as the amount her recipe makes. How much chocolate will she have to use to make the desired amount of candy? She will have to find out how much $2\frac{1}{2}$ times $\frac{3}{8}$ is equal to, will she not? To find $2\frac{1}{2}$ times $\frac{3}{8}$, she should change the $2\frac{1}{2}$ to an improper fraction, and then multiply the two fractions in the usual way. How much chocolate should she use?

$$\begin{array}{l} 2\frac{1}{2} \times \frac{3}{8} = \\ \frac{5}{2} \times \frac{3}{8} = \frac{15}{16} \end{array}$$

Do these multiplications:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
2. $3\frac{1}{2} \times \frac{4}{5}$	$2\frac{3}{5} \times \frac{5}{6}$	$8\frac{1}{9} \times \frac{9}{10}$	$2\frac{3}{4} \times \frac{16}{17}$
3. $3\frac{1}{3} \times \frac{8}{9}$	$4\frac{3}{5} \times \frac{10}{13}$	$2\frac{3}{8} \times \frac{8}{11}$	$3\frac{5}{6} \times \frac{12}{23}$
4. $4\frac{2}{5} \times \frac{10}{11}$	$3\frac{5}{6} \times 2\frac{3}{8}$	$5\frac{1}{6} \times \frac{3}{5}$	$2\frac{3}{8} \times \frac{16}{19}$

5. Find the cost of $2\frac{3}{4}$ yd. of silk at \$2.75 a yard.

6. Mr. Taylor built a set of bookshelves $5\frac{3}{4}$ ft. high. He advised me to build my set about $\frac{2}{3}$ as high. Shall I be following his advice if I build my set 4 ft. high?

7. How much material should Martha buy for 6 towels, each of which is to be $\frac{3}{4}$ yd. long?

8. Find the cost of $\frac{3}{4}$ lb. of candy at 75¢ a pound.

Multiply:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
9. $2\frac{2}{3} \times 12$	$6 \times \frac{5}{8}$	$7 \times 3\frac{1}{7}$	$\frac{5}{6} \times 23$
10. $\frac{3}{8} \times \frac{7}{12}$	$2\frac{3}{5} \times 75$	$8 \times 2\frac{3}{4}$	$\frac{5}{6} \times 3\frac{1}{5}$
11. $2\frac{1}{3} \times 2\frac{1}{4}$	$3\frac{1}{5} \times 5$	$8\frac{2}{3} \times 15$	$2\frac{3}{5} \times \frac{5}{9}$
12. $8 \times \frac{3}{5}$	$8 \times 2\frac{3}{4}$	$\frac{3}{4} \times 17$	$\frac{5}{9} \times \frac{6}{7}$
13. $\frac{7}{8} \times 25$	$\frac{3}{8} \times 2\frac{1}{3}$	$3\frac{1}{2} \times 2\frac{5}{6}$	$2\frac{1}{2} \times 7$

Troublesome Quotients

(1) In doing this example, $39\overline{)3360}$, Fred thought, "3 in 33, 11 times." He wrote 11 in the quotient, but found it wouldn't do. Why?

(2) Next he tried 10 in the quotient. That wouldn't do either. Why?

(3) Would 9 do? Would 8?

Fred would have saved himself a lot of work if he had known that 9 is the largest figure that is ever used in the quotient. Did you know that?

When you are working examples like the one that bothered Fred, start with 9 as the quotient figure, and if that is too large, try 8, then 7, etc., until you get the right figure.

Are these quotient figures correct, and is each one written in the right place?

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
	9	9	8	9	9
1.	$25\overline{)246}$	$35\overline{)3364}$	$48\overline{)4456}$	$58\overline{)5526}$	$29\overline{)2600}$
	9	8	8	9	9
2.	$36\overline{)3342}$	$19\overline{)1563}$	$17\overline{)1432}$	$15\overline{)1456}$	$16\overline{)1502}$

Without using a pencil, give the correct first quotient figure in each of these examples, and tell where to place it:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
3.	$17\overline{)13685}$	$16\overline{)11280}$	$18\overline{)5835}$	$26\overline{)8268}$	$38\overline{)13324}$
4.	$35\overline{)32415}$	$24\overline{)19920}$	$25\overline{)21000}$	$26\overline{)16510}$	$39\overline{)33735}$
5.	$49\overline{)42097}$	$16\overline{)15175}$	$18\overline{)15750}$	$15\overline{)14040}$	$28\overline{)24500}$
6.	$39\overline{)34478}$	$49\overline{)37060}$	$29\overline{)25376}$	$29\overline{)29174}$	$16\overline{)14528}$
7.	$18\overline{)14572}$	$19\overline{)14915}$	$19\overline{)15344}$	$26\overline{)52208}$	$35\overline{)28480}$

Go back and work Examples 3 to 7.

General Review Tests

TEST I

- | | | | |
|--|--|--|----------------------------------|
| 1. $\begin{array}{r} 5367 \\ 284 \\ \hline 4956 \\ 839 \\ 98 \\ \hline 767 \end{array}$ | 2. $\begin{array}{r} 68495 \\ - 7986 \\ \hline \end{array}$ | 3. $\begin{array}{r} 498 \\ \times 563 \\ \hline \end{array}$ | 4. $58 \overline{)11658}$ |
|--|--|--|----------------------------------|
- 5.** How much will $3\frac{1}{2}$ doz. eggs cost at 54¢ a dozen?
- 6.** $4\frac{1}{2} \times 2\frac{1}{3} = ?$ **7.** $6\frac{1}{2} \times 2\frac{1}{2} = ?$ **8.** $3\frac{1}{3} + 4\frac{5}{6}$
- 9.** $3\frac{5}{8} + 2\frac{1}{2}$ **10.** $3\frac{3}{4} + 1\frac{5}{8}$ **11.** $\frac{3}{4} + \frac{5}{6} + \frac{1}{3}$

TEST II

- 1.** Add \$5.65, \$13.74, \$15.32, \$5.86, and \$9.79.
- 2.** From \$354.65 take \$217.39.
- 3.** Multiply 354 by 308.
- 4.** Divide 18,328 by 316.
- 5.** Jimmy's marks in arithmetic for the last four days are 98, 88, 90, 90. What is his average mark for the four days?
- 6.** $3\frac{1}{8} \times 5 = ?$ **7.** $8\frac{1}{4} - 1\frac{5}{8}$ **8.** $2\frac{1}{6} - 1\frac{1}{4}$

TEST III

- 1.** Take \$56.94 from \$100.00.
- 2.** Multiply 496 by 400.
- 3.** Divide 31,960 by 680.
- 4.** Find the sum of 4763, 2985, 4769, 3877, and 5896.
- 5.** Which is larger, a rectangle 12 yd. wide and 14 yd. long or a rectangle $38' \times 42'$? How much larger? Express your answer in square feet.
- 6.** Multiply 8 by $1\frac{1}{3}$. **7.** Multiply $3\frac{1}{2}$ by $2\frac{1}{2}$. **8.** $9\frac{1}{3} - 2\frac{7}{12}$.

General Review Tests

TEST IV

1. 9805
3769
848
79
630
8009

2. 68753
- 29897

3. 689
× 756

4. $72 \overline{)3537}$
5. $9 \times 2\frac{1}{3} = ?$

6. Using a scale of 1 in. to 6 ft., draw a map of a rectangular block $24' \times 36'$. What is the area of the map? What is the area of the rectangular block?

TEST V

1. 3589
3274
5498
7375
6984
7350

2. $3,661 \div 63 =$

3. $759 \times 680 =$

4. $39,825 - 30,409 =$

5. $12 \times 1\frac{1}{5} =$

6. Marie asked her mother for some ribbon to trim a doll's dress. Her mother said: "There is a piece $\frac{3}{4}$ yd. long on the sewing table. You may have $\frac{1}{2}$ of it." Marie took $\frac{1}{2}$ yd. Was that what her mother said she might take?

TEST VI

1. Find how much a grocer must pay for 12 doz. cans of peas at 18¢ a can.

2. Find the cost of $\frac{1}{2}$ doz. bananas at 28¢ a dozen and $\frac{3}{4}$ lb. of boiled ham at 84¢ a pound.

3. The girls in the fifth grade collected \$3.67 to buy toys for poor children last Christmas. If they buy 49-cent dolls, how many dolls can they buy, and how much money will be left over?

4. If a package of 100 envelopes costs \$2.50, can you tell how much each envelope will cost? (Think of the \$2.50 as 250 cents.)

5. Find the cost of $2\frac{3}{4}$ yd. of cotton broadcloth at 59¢ a yard.

6. Find the cost of $1\frac{1}{4}$ yd. of silk at \$1.98 a yard.

Progress Test No. 5

Write just the answers to these examples on your paper. Number each answer. (Record your score.)

1. Take $2\frac{5}{8}$ from $7\frac{1}{4}$.

3. Add $2\frac{5}{8}$ and $3\frac{3}{4}$.

2. Take $3\frac{2}{3}$ from $4\frac{1}{6}$.

4. Add $3\frac{2}{3}$ and $6\frac{3}{4}$.

5. \$356.82

95.78

463.29

8.76

54.93

 .99

6. Find the difference between $12\frac{1}{3}$ and $3\frac{5}{12}$.

7. Multiply 4,573 by 2,300.

8. Divide 1236 by 16.

9. Divide 44,800 by 6,400.

10. Find the cost of $6\frac{3}{4}$ lb. of beef at 36¢ a pound.

11. Harold weighed $78\frac{3}{4}$ lb. three weeks ago. Today he weighs $83\frac{1}{4}$ lb. How much has he gained?

12. $\frac{3}{8} \times \frac{1}{4} =$

15. $\frac{5}{8} \times 9 =$

13. $\frac{5}{7}$ of $\frac{2}{3} =$

16. $\frac{10}{11} \times \frac{3}{5} =$

14. $\frac{5}{8} \times 72 =$

17. $\frac{5}{9} \times \frac{3}{10} =$

18. Change to mixed numbers: $\frac{27}{5}$; $\frac{31}{6}$; $\frac{37}{7}$.

19. Change to improper fractions: $3\frac{1}{5}$; $5\frac{2}{3}$; $6\frac{3}{4}$.

20. $3\frac{1}{2} \times \frac{4}{7} =$

22. $4\frac{3}{8} \times 2\frac{2}{5} =$

21. $\begin{array}{r} 27 \\ \times 5\frac{2}{3} \\ \hline \end{array}$

23. $\begin{array}{r} 30 \\ \times 2\frac{5}{6} \\ \hline \end{array}$

24. Mrs. King bought a fish weighing $1\frac{1}{4}$ lb. and one weighing $1\frac{3}{8}$ lb. for 32¢ a pound. How much change did she get if she paid for them with a 5-dollar bill?

Standards: X, 21. Y, 17. Z, 13.

CHAPTER VI

DIVIDING BY FRACTIONS

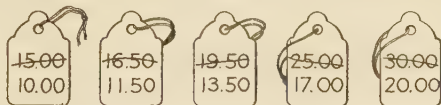
At the Clothing Sale

(1) When Betty and Martha were downtown yesterday, they were looking at some dresses that were on sale.

Betty saw this price tag on a dress she liked. She said: "My! these dresses are cheap. This dress has $\frac{1}{3}$ taken off the regular price." Martha said it hadn't. Had it?



(2) Just for fun they went around and looked at the price tags on some other dresses to see if the store had taken $\frac{1}{3}$ off the regular prices of most of them. These are the tags they saw. Is $\frac{1}{3}$ taken off the regular price in each case?



(3) Below are some price tags they saw on some coats. Is $\frac{1}{4}$ taken off the price of each coat?



(4) What will be the sale price of an overcoat, the regular price of which is \$40, if $\frac{1}{4}$ is taken off the regular price?

(5) One store offered its goods for sale at $\frac{1}{3}$ off the regular price. Another store offered its goods at $\frac{1}{4}$ off the regular price. Which store was making the greater cut in prices?

(6) How much will you pay for a coat which is regularly priced at \$16 if you pay $\frac{3}{4}$ of that price for it?

(7) What will be the sale price of a hat, the regular price of which is \$6.00, if $\frac{1}{5}$ is taken off the regular price?

Dividing by Fractions

(1) Alice had a 3-inch strip of adhesive tape to cut into pieces $\frac{3}{4}$ of an inch long. Can you tell how many pieces she will have?

You would have to find how many times $\frac{3}{4}$ is contained in 3, wouldn't you? In other words, you would have to divide 3 by $\frac{3}{4}$.

This picture shows that $\frac{3}{4}$ is contained in 3, four times, that is, $3 \div \frac{3}{4} = 4$.



(2) Rose wants to divide a 10-inch line into sections $\frac{1}{2}$ in. long. How many sections will she have? That is, how many times is $\frac{1}{2}$ in. contained in 10 in.? Use your ruler and find out by counting. Your answer shows you that $10 \div \frac{1}{2} = 20$.

(3) Arthur divides 3 by $\frac{3}{4}$ this way: $3 \div \frac{3}{4} = \frac{1}{3} \times \frac{4}{\frac{3}{1}} = 4$

(4) Arthur said to his classmates: "Do you see what I do? First I invert the fraction (turn it upside down). That changes $\frac{3}{4}$ to $\frac{4}{3}$. Then, instead of dividing, I multiply. Isn't that easy?"

Suppose that I have to divide 10 by $\frac{1}{2}$. I do it in the same way, like this: $10 \div \frac{1}{2} = 10 \times \frac{2}{1} = 20$."

Is that the same answer you got with the ruler?

"Does that method work with any example?" asked Grace.

"Certainly," said Arthur. "Count the number of times $\frac{3}{8}$ in. is contained in 6 in. on your ruler; then find $6 \div \frac{3}{8}$ my way."

Grace found by her ruler that $\frac{3}{8}$ inch is contained in 6 in., 16 times. Is that right?

Then she used Arthur's way, $6 \div \frac{3}{8} = \frac{2}{6} \times \frac{8}{\frac{3}{1}} = 16$.

"What an easy way to divide by a fraction," said Grace.

To divide a whole number by a fraction, invert the fraction and multiply.

Dividing by Fractions

Do these divisions:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $4 \div \frac{1}{3}$	$8 \div \frac{5}{3}$	$9 \div \frac{3}{8}$	$12 \div \frac{4}{5}$
2. $6 \div \frac{2}{5}$	$6 \div \frac{4}{5}$	$16 \div \frac{8}{9}$	$20 \div \frac{5}{8}$
3. $8 \div \frac{3}{4}$	$7 \div \frac{2}{3}$	$3 \div \frac{11}{12}$	$16 \div \frac{8}{15}$
4. $9 \div \frac{3}{5}$	$10 \div \frac{5}{7}$	$4 \div \frac{2}{3}$	$5 \div \frac{1}{5}$

One day a drawing teacher was giving instructions to a fifth-grade class. She said: "Draw a line $\frac{3}{4}$ of an inch long and divide it into sections $\frac{1}{8}$ of an inch long. How many sections will you have?"

Can you find how many times $\frac{1}{8}$ of an inch is contained in $\frac{3}{4}$ of an inch? That is, can you divide $\frac{3}{4}$ by $\frac{1}{8}$? Look at your ruler and see how many times $\frac{1}{8}$ is contained in $\frac{3}{4}$ of an inch. Does $\frac{3}{4} \div \frac{1}{8} = 6$?

Arthur said: "I can use my method for dividing a fraction by a fraction too. You do it in exactly the same way as when you divide a whole number by a fraction. You just invert the divisor

and multiply like this: $\frac{3}{4} \div \frac{1}{8} = \frac{3}{4} \times \frac{8}{1} = 6$.

That shows that $\frac{1}{8}$ is contained in $\frac{3}{4}$, 6 times."

To divide a fraction by a fraction, invert the divisor and multiply.

Do these divisions:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
5. $\frac{3}{4} \div \frac{1}{3}$	$\frac{8}{9} \div \frac{1}{6}$	$\frac{6}{7} \div \frac{1}{3}$	$\frac{4}{5} \div \frac{1}{2}$
6. $\frac{3}{8} \div \frac{1}{4}$	$\frac{3}{10} \div \frac{1}{5}$	$\frac{5}{8} \div \frac{5}{6}$	$\frac{8}{9} \div \frac{3}{4}$
7. $\frac{2}{5} \div \frac{4}{9}$	$\frac{3}{8} \div 6$	$\frac{3}{8} \div \frac{1}{8}$	$\frac{7}{10} \div \frac{2}{5}$
8. $\frac{4}{7} \div \frac{3}{5}$	$\frac{3}{5} \div \frac{6}{7}$	$\frac{8}{9} \div \frac{2}{3}$	$\frac{1}{4} \div \frac{4}{5}$
9. $\frac{2}{7} \div \frac{4}{5}$	$\frac{5}{8} \div \frac{5}{16}$	$\frac{1}{3} \div 3$	$\frac{6}{15} \div \frac{2}{3}$

A Fraction Divided by a Whole Number

Mrs. Baker has one half of a chocolate cake. She wants to serve it to 4 persons. Can you tell what part of a whole cake each one will get?

We can see by the picture that when $\frac{1}{2}$ of a cake is divided equally among 4 persons, each one gets $\frac{1}{8}$ of the cake. $\frac{1}{2} \div 4 = \frac{1}{8}$.



Arthur said: "I can divide $\frac{1}{2}$ by 4 just as I would divide $\frac{1}{2}$ by a fraction. I just invert the divisor and multiply."

"How would you invert 4?" asked Alice.

"You just think of the 4 as a fraction $\frac{4}{1}$; then, to invert it, you write $\frac{1}{4}$. $\frac{1}{2} \div 4 = \frac{1}{2} \div \frac{4}{1} = \frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$."

"It works every time. For example, let us divide $\frac{3}{4}$ by 9.

$$\frac{3}{4} \div 9 = \frac{3}{4} \div \frac{9}{1} = \frac{3}{4} \times \frac{1}{9} = \frac{1}{12}."$$

"How do you know that's right?" asked Alice.

"You can check any division example by multiplying this way," said Arthur. "If $\frac{3}{4} \div 9 = \frac{1}{12}$, then $9 \times \frac{1}{12} = \frac{3}{4}$." Does it?

1. $\frac{1}{3} \div 4 = \frac{1}{3} \div \frac{4}{1} = \frac{1}{3} \times \frac{1}{4} = ?$ Check: $4 \times \frac{1}{12} = \frac{1}{3}$

2. $\frac{2}{3} \div 6 = \frac{2}{3} \div \frac{6}{1} = \frac{2}{3} \times \frac{1}{6} = ?$ Check: $6 \times \frac{1}{9} = \frac{2}{3}$

3. $\frac{3}{4} \div 9 = \frac{3}{4} \div \frac{9}{1} = \frac{3}{4} \times \frac{1}{9} = ?$ Check: $9 \times \frac{1}{9} = 1$

Do these divisions: (Check by multiplying.)

4. $\frac{1}{5} \div 6$

7. $\frac{2}{3} \div 4$

10. $\frac{2}{9} \div 10$

13. $\frac{3}{4} \div 12$

5. $\frac{7}{8} \div 7$

8. $\frac{5}{9} \div 4$

11. $\frac{4}{5} \div 6$

14. $\frac{2}{5} \div 10$

6. $\frac{5}{6} \div 5$

9. $\frac{3}{8} \div 6$

12. $\frac{7}{9} \div 14$

15. $\frac{3}{8} \div 15$

16. If you divide a strip of ribbon $\frac{3}{8}$ yd. long into 6 equal lengths, how long will each piece be?

17. If $\frac{3}{4}$ pie is divided equally among 6 persons, what fraction of a whole pie will each one get?

The Candy Sale*

1. The Athletic Association is having a candy sale. The girls are putting $\frac{1}{8}$ of a pound of candy in paper bags and selling it for 5¢ a bag. Tell how many 5-cent bags of candy each of these children can fill.

- | | |
|--|---|
| <i>a.</i> Jo made $\frac{1}{2}$ lb. taffy. | <i>d.</i> Blanche : 1 lb. caramels. |
| <i>b.</i> Doris : $\frac{3}{4}$ lb. fudge. | <i>e.</i> Rose : 3 lb. peanut brittle. |
| <i>c.</i> Ella : 2 lb. sea foam. | <i>f.</i> Alice : $\frac{1}{4}$ lb. marshmallows. |

2. How much will the Athletic Association take in by selling these 5-cent bags? (Save your answer.)

3. At the same rate how much candy should they put in a 10-cent bag?

4. How many 10-cent bags can each of these children fill?

- | | |
|--|------------------------------------|
| <i>a.</i> Grace : $\frac{1}{2}$ lb. nougat. | <i>d.</i> Olive : 2 lb. taffy. |
| <i>b.</i> Florence : $\frac{3}{4}$ lb. mint drops. | <i>e.</i> Marion : 3 lb. fudge. |
| <i>c.</i> Harriet : 4 lb. cream wafers. | <i>f.</i> Mabel : 1 lb. nut candy. |

5. How much will the Athletic Association take in by selling these 10-cent bags? (Save your answer.)

6. At the same rate how much candy should they put in a 15-cent bag?

7. How many 15-cent bags can each of these children fill?

- | | |
|---|--|
| <i>a.</i> Esther : 3 lb. fudge. | <i>d.</i> Ann : $1\frac{1}{8}$ lb. peanut brittle. |
| <i>b.</i> Ethel : $1\frac{1}{2}$ lb. panocha. | <i>e.</i> Margaret : $1\frac{7}{8}$ lb. sea foam. |
| <i>c.</i> Dorothy : $\frac{3}{4}$ lb. taffy. | <i>f.</i> Edna : $2\frac{1}{4}$ lb. caramels. |

8. How much will the Athletic Association take in by selling the candy mentioned in Example 7?

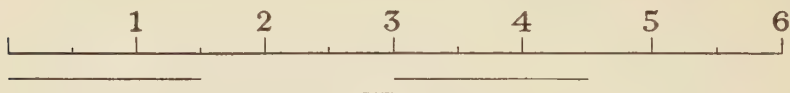
9. How much will they take in on the 5-cent, 10-cent, and 15-cent bags all together?

10. The children weighed their candy on a balance scale. They had 1-ounce, 2-ounce, 4-ounce, and 8-ounce weights. Tell which weights they used to weigh the candy for the 5-cent, 10-cent, and 15-cent bags.

A Whole Number Divided by a Mixed Number

(1) Some rulers are made $1\frac{1}{2}$ ft. long. Could you find out how many such rulers could be cut from a strip of wood 6 ft. long?

(2) Draw a line 6 inches long and lay off on it $1\frac{1}{2}$ -inch lengths. How many $1\frac{1}{2}$ -in. lengths do you find there are in 6 in.?



(3) How many $1\frac{1}{2}$ -ft. lengths are there in 6 ft.?

(4) How many times is $1\frac{1}{2}$ contained in 6?

(5) To find how many times $1\frac{1}{2}$ is contained in 6, you have to divide 6 by $1\frac{1}{2}$, don't you? You have learned how to divide a whole number by a fraction; so just change $1\frac{1}{2}$ to a fraction, and you know how to do this example. Here it is worked for you:

$$6 \div 1\frac{1}{2} = 6 \div \frac{3}{2} = 6 \times \frac{2}{3} = 4$$

To divide a whole number by a mixed number, change the mixed number to an improper fraction and then divide.

Complete:

1. $16 \div 1\frac{1}{3} = 16 \div \frac{4}{3} = 16 \times \frac{3}{4} = ?$

2. $20 \div 2\frac{1}{2} = 20 \div \frac{5}{2} = 20 \times \frac{2}{5} = ?$

3. $21 \div 3\frac{1}{2} = 21 \div \frac{7}{2} = 21 \times \frac{2}{7} = ?$

4. $25 \div 2\frac{1}{3} = 25 \div \frac{7}{3} = 25 \times \frac{3}{7} = ?$

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
5. $18 \div 2\frac{1}{4}$	$20 \div 1\frac{1}{8}$	$20 \div 2\frac{1}{2}$	$21 \div 3\frac{1}{2}$
6. $24 \div 2\frac{1}{2}$	$36 \div 2\frac{1}{4}$	$21 \div 2\frac{1}{10}$	$75 \div 2\frac{1}{2}$
7. $63 \div 2\frac{1}{3}$	$81 \div 4\frac{1}{2}$	$90 \div 2\frac{1}{2}$	$72 \div 2\frac{1}{4}$
8. $19 \div 1\frac{2}{3}$	$21 \div 3\frac{1}{4}$	$18 \div 5\frac{3}{5}$	$16 \div 8\frac{1}{4}$
9. $15 \div 3\frac{1}{4}$	$17 \div 8\frac{1}{2}$	$18 \div 2\frac{1}{2}$	$21 \div 5\frac{1}{4}$

A Fraction Divided by a Mixed Number

Bernice Barry's baby sister gained $\frac{3}{4}$ lb. in $4\frac{1}{2}$ days. What was her average gain in weight a day? To find out, you would have to divide the number of pounds by the number of days, wouldn't you? This is the way you can divide to find out: First change the mixed number $4\frac{1}{2}$ to an improper fraction. Then just divide $\frac{3}{4}$ by $\frac{9}{2}$ in the usual way.

$$\frac{3}{4} \div 4\frac{1}{2} = \frac{3}{4} \div \frac{9}{2} = \frac{3}{4} \times \frac{2}{9} = \frac{1}{6}$$

Divide:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $\frac{2}{3} \div 1\frac{1}{2}$	$\frac{5}{6} \div 2\frac{1}{3}$	$3\frac{1}{5} \div 1\frac{1}{3}$	$2\frac{1}{2} \div 1\frac{1}{4}$
2. $\frac{7}{8} \div 2\frac{1}{3}$	$\frac{5}{9} \div 1\frac{1}{3}$	$4\frac{1}{6} \div 3\frac{1}{5}$	$3\frac{5}{8} \div 1\frac{1}{3}$
3. $\frac{4}{9} \div 3\frac{1}{3}$	$\frac{2}{15} \div 1\frac{1}{10}$	$4\frac{3}{5} \div 1\frac{4}{5}$	$5\frac{1}{2} \div 3\frac{1}{4}$

4. How many bands $\frac{5}{8}$ yd. long can be cut from a 10-yd. piece of ribbon?

5. If you have $\frac{3}{4}$ of a pound of candy, how many bags which hold $\frac{1}{8}$ lb. each can you fill with it?

6. Harry had $\frac{3}{4}$ of a watermelon. If he divided it equally among 6 boys, what part of the melon would each boy get?

7. Mrs. Allen has 10 yards of curtain material. Each pair of the curtains she wants to make requires $2\frac{3}{4}$ yd. How many pairs can she make? Will she have any material left? If so, how much?

8. If $\frac{1}{8}$ in. on a map represents 1 mile, how long a distance does a line $\frac{1}{4}$ in. long represent? a line $\frac{1}{2}$ in. long? a line 1 in. long? a line 2 in. long? a line 4 in. long?

A Mixed Number Divided by a Fraction

(1) Mrs. Leeds has $4\frac{1}{2}$ yards of toweling. She wants to cut it up into towels $\frac{3}{4}$ yd. in length. Do you know how many towels she can make? She would have to find how many times $\frac{3}{4}$ yd. is contained in $4\frac{1}{2}$ yd., wouldn't she?

(2) Draw a line $4\frac{1}{2}$ in. long. Divide it into sections $\frac{3}{4}$ in. long.

(3) How many $\frac{3}{4}$ -inch lengths do you find there are in $4\frac{1}{2}$ in.?

(4) How many $\frac{3}{4}$ -yard lengths are there in $4\frac{1}{2}$ yd.?

(5) How many times is $\frac{3}{4}$ contained in $4\frac{1}{2}$? (See diagram, p. 109.)

(6) To find how many times $\frac{3}{4}$ is contained in $4\frac{1}{2}$, you have to divide $4\frac{1}{2}$ by $\frac{3}{4}$, don't you? You have learned how to divide a fraction by a fraction. Change $4\frac{1}{2}$ to a fraction and you will know how to finish the example.

$$4\frac{1}{2} \div \frac{3}{4} = \frac{9}{2} \div \frac{3}{4} = \frac{9}{2} \times \frac{4}{3} = 6$$

(7) Does the division example above give you the same answer you got in Examples (3), (4), and (5)?

To divide a mixed number by a fraction, change the mixed number to an improper fraction and then divide.

$$(8) \quad 3\frac{1}{3} \div \frac{5}{6} = \frac{10}{3} \div \frac{5}{6} = ? \qquad (9) \quad 2\frac{1}{3} \div \frac{7}{8} = \frac{7}{3} \div \frac{7}{8} = ?$$

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $3\frac{1}{8} \div \frac{7}{8}$	$5\frac{1}{3} \div \frac{5}{6}$	$2\frac{1}{9} \div \frac{2}{3}$	$6\frac{3}{5} \div \frac{9}{10}$
2. $8\frac{1}{5} \div \frac{9}{10}$	$4\frac{1}{6} \div \frac{5}{12}$	$2\frac{3}{8} \div \frac{7}{16}$	$1\frac{4}{9} \div \frac{5}{9}$
3. $6\frac{1}{3} \div \frac{7}{12}$	$3\frac{8}{9} \div \frac{5}{12}$	$2\frac{3}{5} \div \frac{24}{25}$	$3\frac{1}{8} \div \frac{15}{16}$
4. $2\frac{1}{4} \div \frac{5}{24}$	$3\frac{1}{8} \div \frac{5}{6}$	$4\frac{3}{7} \div \frac{5}{14}$	$8\frac{1}{3} \div \frac{25}{26}$

5. If you need $\frac{5}{8}$ cup of grated coconut for one cake, how many cakes could you make if you had $3\frac{1}{8}$ cups of grated coconut?

A Mixed Number Divided by a Mixed Number

(1) Mrs. Perry has $9\frac{1}{3}$ cups of flour. Her cake recipe calls for $2\frac{1}{3}$ cups of flour for a cake. She has flour enough for how many cakes? You will need to find out how many times $2\frac{1}{3}$ is contained in $9\frac{1}{3}$, will you not? Can you think of a way to divide $9\frac{1}{3}$ by $2\frac{1}{3}$? (HINT. If $9\frac{1}{3}$ and $2\frac{1}{3}$ were changed to fractions, would the example be easy to work?)

(2) Do you see how the hint has been followed in this solution of the example?

$$9\frac{1}{3} \div 2\frac{1}{3} = \frac{28}{3} \div \frac{7}{3} = \frac{28}{\underset{1}{3}} \times \frac{\underset{1}{3}}{7} = 4$$

To divide a mixed number by a mixed number, change the mixed numbers to improper fractions and then divide.

There is one error in these divisions. Can you find it?

$$(3) \quad 5\frac{1}{3} \div 1\frac{1}{6} = \frac{16}{3} \div \frac{7}{6} = \frac{16}{\underset{1}{3}} \times \frac{\overset{2}{6}}{7} = \frac{32}{7} = 4\frac{4}{7}$$

$$(4) \quad 2\frac{3}{5} \div 1\frac{1}{5} = \frac{13}{5} \div \frac{6}{5} = \frac{13}{\underset{1}{5}} \times \frac{\overset{1}{5}}{6} = \frac{13}{6} = 2\frac{1}{6}$$

$$(5) \quad 3\frac{1}{2} \div 1\frac{1}{7} = \frac{7}{2} \div \frac{8}{7} = \frac{7}{\underset{1}{2}} \times \frac{\overset{4}{8}}{\underset{1}{7}} = 4$$

Do these divisions:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $2\frac{1}{6} \div 3\frac{2}{3}$	$7\frac{1}{5} \div 3\frac{1}{5}$	$2\frac{1}{8} \div 1\frac{1}{4}$	$5\frac{5}{6} \div 3\frac{2}{3}$
2. $8\frac{1}{9} \div 1\frac{1}{6}$	$2\frac{3}{4} \div 1\frac{1}{2}$	$3\frac{1}{5} \div 1\frac{1}{10}$	$2\frac{1}{3} \div 1\frac{1}{9}$
3. $3\frac{1}{3} \div 1\frac{1}{5}$	$4\frac{2}{3} \div 1\frac{5}{6}$	$3\frac{1}{2} \div 2\frac{1}{3}$	$3\frac{1}{5} \div 1\frac{3}{5}$
4. $6\frac{1}{2} \div 1\frac{3}{4}$	$8\frac{1}{3} \div 1\frac{2}{3}$	$6\frac{1}{4} \div 3\frac{1}{2}$	$7\frac{1}{3} \div 2\frac{2}{3}$
5. $8\frac{3}{4} \div 1\frac{3}{7}$	$2\frac{5}{6} \div 1\frac{5}{6}$	$4\frac{2}{9} \div 3\frac{1}{3}$	$7\frac{2}{5} \div 3\frac{1}{8}$

A Mixed Number Divided by a Whole Number

If you wanted to divide $2\frac{1}{2}$ lb. of candy equally among 4 persons, how much would you give to each one? Here is an easy way to find out :

$$\begin{aligned} 2\frac{1}{2} \div 4 &= \\ \frac{5}{2} \div \frac{4}{1} &= \\ \frac{5}{2} \times \frac{1}{4} &= \frac{5}{8} \end{aligned}$$

To divide a mixed number by a whole number, first change the mixed number to a fraction, then make the whole number into a fraction by writing it over 1. Then divide one fraction by the other as usual.

Divide:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $2\frac{1}{2} \div 5$	$3\frac{2}{3} \div 4$	$5\frac{2}{3} \div 2$	$1\frac{5}{7} \div 6$
2. $4\frac{2}{3} \div 7$	$8\frac{1}{3} \div 5$	$8\frac{1}{3} \div 10$	$2\frac{1}{6} \div 2$
3. $3\frac{3}{8} \div 18$	$3\frac{3}{7} \div 16$	$2\frac{7}{9} \div 15$	$3\frac{1}{6} \div 4$

4. If you divide $\frac{3}{4}$ of a cake equally among 6 persons, what part of a cake will each get?

5. If you divide $1\frac{1}{2}$ cakes equally among 9 persons, what part of a cake will each get?

6. If one dress pattern requires $3\frac{1}{4}$ yd. of material, how many such dress patterns can a clerk cut out of a 10-yard piece of material? Will there be any material left over?

7. If you wish to cut $5\frac{3}{4}$ yd. of material into four equal lengths, how long should you make each piece?

Divide:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
8. $2\frac{1}{2} \div \frac{5}{6}$	$\frac{2}{3} \div \frac{4}{5}$	$\frac{5}{8} \div 10$	$9 \div 1\frac{1}{2}$
9. $\frac{2}{3} \div 1\frac{5}{6}$	$1\frac{2}{3} \div \frac{5}{6}$	$1\frac{1}{2} \div 1\frac{1}{3}$	$2\frac{2}{3} \div 4$
10. $10 \div \frac{2}{3}$	$\frac{5}{6} \div \frac{1}{3}$	$\frac{5}{6} \div 2\frac{1}{3}$	$8 \div 1\frac{3}{4}$
11. $\frac{5}{6} \div 1\frac{1}{4}$	$2\frac{1}{3} \div \frac{5}{6}$	$1\frac{2}{3} \div \frac{1}{6}$	$2\frac{1}{5} \div 1\frac{1}{3}$
12. $3\frac{1}{3} \div 14$	$9 \div \frac{7}{8}$	$\frac{7}{8} \div 9$	$2\frac{1}{5} \div 4$

Fractions

(1) If you have 8 inches of ribbon and divide it into 4-inch pieces, how many pieces will you have?

(2) If you divide it into 2-inch pieces, how many pieces will you have?

(3) If you divide it into 1-inch pieces, how many pieces will you have?

(4) If you divide it into $\frac{1}{2}$ -inch lengths, how many will you have?

(5) If you divide it into $\frac{1}{4}$ -inch lengths, how many pieces will you have?

(6) Some children have the idea that the answer to a division example is always smaller than the number that is being divided. Do you think that is true?

Dividing a whole number by a proper fraction always gives you an answer larger than the number divided. If you remember this, it will help you in judging whether your answers are about right.

In the following, tell without working the examples whether your answer will be smaller or larger than the number divided. If the class does not agree with you, you may wish to work the example to prove who is right.

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $128 \div 2$	$13 \div \frac{1}{2}$	$42 \div \frac{4}{3}$	$86 \div \frac{2}{3}$
2. $21 \div \frac{5}{4}$	$18 \div 3$	$18 \div \frac{1}{2}$	$16 \div \frac{1}{3}$
3. $28 \div \frac{1}{4}$	$28 \div 4$	$40 \div \frac{1}{5}$	$40 \div 5$
4. $42 \div \frac{5}{4}$	$32 \div \frac{1}{8}$	$42 \div 8$	$48 \div \frac{1}{6}$
5. $125 \div 4$	$125 \div 5$	$125 \div \frac{4}{5}$	$125 \div \frac{5}{4}$
6. $75 \div 3$	$75 \div 2$	$75 \div \frac{2}{3}$	$75 \div \frac{3}{2}$

7. Estimate the answers to Examples 1 to 6; then work each one and see how near your estimate was.

Marking a Test Paper*

Here is a test paper belonging to John Reed. Can you find any mistakes in his work?

Arithmetic.

John Reed.

$$1. \frac{5}{6} = \frac{5}{6}$$

$$\frac{2}{3} = \frac{4}{6}$$

$$\frac{1}{2} = \frac{3}{6}$$

$$\frac{12}{6} = 2 \text{ Ans.}$$

$$2. 11\frac{2}{3} = 11\frac{8}{12}$$

$$+ 2\frac{1}{2} = 2\frac{6}{12}$$

$$13\frac{14}{12} = 14\frac{2}{12} = 14\frac{1}{6} \text{ Ans.}$$

$$3. 8\frac{4}{5} = 8\frac{8}{10}$$

$$- 2\frac{1}{2} = 2\frac{5}{10}$$

$$6\frac{3}{10} \text{ Ans.}$$

$$4. 8\frac{1}{8} = 7\frac{9}{8}$$

$$- 2\frac{1}{2} = 2\frac{4}{8}$$

$$5\frac{5}{8} \text{ Ans.}$$

$$5. \frac{2}{3} \times \frac{6}{7} = \frac{12}{21} \text{ Ans.} \quad 6. 4 \div \frac{1}{2} = 4 \times \frac{2}{1} = 8 \text{ Ans.}$$

$$7. 1\frac{5}{6} \times 1\frac{2}{11}$$

$$= \frac{11}{6} \times \frac{13}{11} = \frac{13}{6} \text{ Ans.}$$

$$8. \frac{2}{3} \div 1\frac{1}{8} =$$

$$\frac{2}{3} \times \frac{8}{9} = \frac{16}{27} \text{ Ans.}$$

$$9. \frac{5}{6} \div 10$$

$$= \frac{5}{6} \times \frac{1}{10} = \frac{1}{12} \text{ Ans.}$$

$$10. 1\frac{3}{4} \div 4\frac{2}{3}$$

$$= \frac{7}{4} \div \frac{14}{3}$$

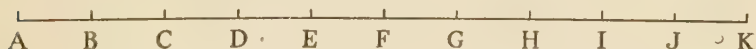
$$\frac{7}{4} \times \frac{3}{14} = \frac{3}{8} \text{ Ans.}$$

Scale Drawing*

1. This map represents a road from my grandfather's farm to the nearest village. One inch on the drawing represents 1 mile. Using your ruler, can you find out how far it is from the farm to the creamery?



2. How far is it from the creamery to the mill?
3. What is the distance from the mill to the village?
4. How far is it from the farm to the village by the road?
5. We went to the village twice a day for the mail last summer. How far did we travel each day?



6. The distance from *A* to *B* on this line represents $\frac{3}{8}$ of a mile. What distance is represented by the part of the line from
- A* to *C*? from *A* to *D*? *A* to *F*? *A* to *H*? *A* to *K*?
B to *D*? *B* to *G*? *B* to *H*? *B* to *J*? *B* to *K*? *D* to *E*?
C to *H*? *E* to *J*? *G* to *I*? *G* to *K*?

7. If $\frac{1}{4}$ in. on a geography map represents a distance of 50 miles, an inch represents ____ miles.

8. A map is drawn to the scale of $\frac{1}{8}$ in. to 25 miles. If the distance on the map between two cities is $2\frac{1}{2}$ in., the actual distance between them is ____ miles.

9. What scale was used in drawing the map of the United States in your geography book?

Problem Study

1. Mrs. Turner paid for $1\frac{1}{2}$ yd. of silk at \$2.50 a yard and a 45-cent pattern with a 5-dollar bill. How much change should she receive? (See Ex. 1, page 89.)

2. Walking at the rate of $3\frac{1}{2}$ mi. an hour, how long will it take me to go 14 mi.? (See Ex. 5, page 89.)

3. Mr. Stern bought a lot for \$650. It cost him \$5980 to build a house on the lot. He sold the house for \$7000. How much did he gain on it? (See Ex. 3, page 89.)

4. We use about 6 lb. of sugar a week. My father has just had two 25-lb. bags of sugar sent home; so that ought to last us ____ weeks. (See Ex. 4, page 89.)

5. Grace sold $12\frac{1}{2}$ doz. eggs at 35¢ a dozen. How many rose bushes at 40¢ each can she buy with her money, and how much money will she have left? (See Ex. 2, page 89.)

6. An airplane that travels 685 mi. in $6\frac{1}{2}$ hr. travels at a rate of about ____ mi. an hour. (See Ex. 6, page 89.)

7. Find the cost of 3 doz. cans of corn, when corn is selling at 3 cans for 50¢. (See Ex. 9, page 89.)

8. A piano dealer said, "You may have this \$840 piano for $\frac{3}{4}$ of that price." The dealer was offering me the piano for _____. (See Ex. 8, page 89.)

9. Find the cost of finishing a floor $18\frac{1}{2}'$ by $20\frac{1}{4}'$ at 8¢ a square foot. (See Ex. 7, page 89.)

10. Riding at a rate of 25 miles an hour, how long shall I allow myself for a trip of 123 miles? (See Ex. 5, page 89.)

11. Starting at 8 o'clock last Saturday morning, we walked continuously until 11:30 A.M. and covered 13 miles. Do you know what our average rate of walking was? (See Ex. 6, page 89.)

12. Find the cost of 2 doz. watermelons, when they are selling at 3 for \$1.00. (See Ex. 9, page 89.)

Fractions

1. Add each of the following to $6\frac{1}{4}$:

$$3\frac{1}{2} \quad 3\frac{1}{3} \quad 5\frac{1}{2} \quad 4\frac{4}{5} \quad 1\frac{1}{3} \quad 1\frac{1}{2} \quad 1\frac{1}{8} \quad 2\frac{2}{5} \quad 1\frac{7}{8}$$

2. Subtract each of the mixed numbers in Example 1 from $6\frac{1}{2}$; subtract each of the mixed numbers in Example 1 from 7.

3. Multiply each of the mixed numbers in Example 1 by $1\frac{1}{2}$.

4. Divide each of the mixed numbers in Examples 1 by 4; by $1\frac{1}{2}$.

Tell the missing numbers in Examples 5 to 12.

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
5. $\frac{3}{4} + \frac{1}{2} = ?$	$8 + \frac{1}{2} = ?$	$1\frac{2}{5} + 7 = ?$	$2\frac{1}{2} + 1\frac{3}{4} = ?$
6. $\frac{3}{4} - \frac{1}{2} = ?$	$8 - \frac{1}{2} = ?$	$7 - 1\frac{2}{5} = ?$	$2\frac{1}{2} - 1\frac{3}{4} = ?$
7. $\frac{3}{4} \times \frac{1}{2} = ?$	$8 \times \frac{1}{2} = ?$	$7 \times 1\frac{2}{5} = ?$	$2\frac{1}{2} \times 1\frac{3}{4} = ?$
8. $\frac{3}{4} \div \frac{1}{2} = ?$	$8 \div \frac{1}{2} = ?$	$1\frac{2}{5} \div 7 = ?$	$2\frac{1}{2} \div 1\frac{3}{4} = ?$
9. $\frac{5}{6} + \frac{1}{3} = ?$	$\frac{3}{4} + 4 = ?$	$8 + 1\frac{5}{6} = ?$	$2\frac{2}{3} + 1\frac{1}{4} = ?$
10. $\frac{5}{6} - \frac{1}{3} = ?$	$4 - \frac{3}{4} = ?$	$8 - 1\frac{5}{6} = ?$	$2\frac{2}{3} - 1\frac{1}{4} = ?$
11. $\frac{5}{6} \times \frac{1}{3} = ?$	$\frac{3}{4} \times 4 = ?$	$1\frac{5}{6} \times 8 = ?$	$2\frac{2}{3} \times 1\frac{1}{4} = ?$
12. $\frac{5}{6} \div \frac{1}{3} = ?$	$\frac{3}{4} \div 4 = ?$	$8 \div 1\frac{5}{6} = ?$	$2\frac{2}{3} \div 1\frac{1}{4} = ?$

13. If you need $\frac{7}{8}$ yd. of linen for one towel, how much linen do you need for a dozen towels?

14. At a sale Mrs. Ross bought a piece of toweling containing 14 yd. for 29¢ a yard. How much did the toweling cost her?

15. If she cuts the 14 yd. of material into towels $\frac{7}{8}$ yd. in length, how many towels can she make?

16. What will be the cost of each towel?

Fractional Parts

(1) We have learned that the denominator of a fraction tells into how many equal parts an object is divided, and the numerator tells how many of those parts you are interested in or thinking about. For example, if you wish to tell me what part of this box is empty, you would think: The box is divided into ____ equal parts. ____ of those parts is empty. Therefore $\frac{1}{6}$ of the box is empty.



(2) If, however, you wish to tell me what part of the box is full, what do you think?

(3) If a pound is divided into 16 equal parts, each part is called an _____. If I think of one ounce, I am thinking of $\frac{1}{16}$ of a pound. If I think of two ounces, I am thinking of $\frac{2}{16}$ of a pound.

Tell the answers to these examples:

1. 1 lb. = ____ oz.

2. 1 ft. = ____ in.

1 oz. = $\frac{1}{16}$ lb.

1 in. = $\frac{1}{12}$ ft.

2 oz. = $2 \times \frac{1}{16} = \frac{2}{16} = \frac{1}{8}$ lb.

2 in. = $2 \times \frac{1}{12} = \frac{2}{12} = \frac{1}{6}$ ft.

3 oz. = $3 \times \frac{1}{16} = \frac{3}{16}$ lb.

3 in. = $3 \times \frac{1}{12} = \frac{3}{12} = \frac{1}{4}$ ft.

4 oz. = $4 \times \frac{1}{16} = \frac{4}{16} = \frac{1}{4}$ lb.

4 in. = $4 \times \frac{1}{12} = \frac{4}{12} = \frac{1}{3}$ ft.

5 oz. = $5 \times \frac{1}{16} = \frac{5}{16}$ lb.

5 in. = $5 \times \frac{1}{12} = \frac{5}{12}$ ft.

6 oz. = $6 \times \frac{1}{16} = \frac{6}{16} = \frac{3}{8}$ lb.

6 in. = $6 \times \frac{1}{12} = \frac{6}{12} = \frac{1}{2}$ ft.

3. What part of a pound is 7 oz.? 8 oz.? 9 oz.? 10 oz.? 11 oz.? 12 oz.? 13 oz.? 14 oz.? 15 oz.?

4. What part of a foot is 7 in.? 8 in.? 9 in.? 10 in.? 11 in.?

5. What part of a yard is 4 in.? 6 in.? 8 in.? 9 in.? 12 in.? 16 in.? 18 in.? 24 in.? 27 in.?

6. What part of an hour is 5 min.? 10 min.? 12 min.? 15 min.? 24 min.? 25 min.? 30 min.? 40 min.? 48 min.? 50 min.?

7. What part of a quarter is a nickel? a dime?

8. What part of a dollar is a quarter? a dime? a nickel?

Earning Money

1. Jim works for a grocer every Saturday. Last Saturday he worked 6 hours and 20 minutes. The grocer pays him 30¢ an hour; so he gave Jim \$1.90 for his day's work. Jim's small brother didn't know whether or not that was what he should have had. Do you think it was?

This is what Jim said: "For 6 hours at 30¢ an hour I ought to receive _____. 20 minutes is $\frac{20}{60}$ of an hour, or $\frac{1}{3}$ hour. $\frac{1}{3}$ of an hour's pay is $\frac{1}{3}$ of _____, or _____. So I should have received _____ for the 6 hours plus _____ for the 20 minutes, which equals _____ all together."

2. The day before Christmas, Jim worked 7 hours and 30 minutes. For the 7 hours he received _____; for the 30 minutes he received $\frac{30}{60}$ of an hour's pay, or $\frac{1}{2}$ of 30¢. He received _____ for his day's work.

3. Find what Jim should receive if he works

- | | |
|------------------------|------------------------|
| a. 6 hours 15 minutes; | d. 3 hours 10 minutes; |
| b. 5 hours 45 minutes; | e. 6 hours 50 minutes; |
| c. 4 hours 40 minutes; | f. 5 hours 25 minutes. |

4. Ted works for a fruit dealer. During one week he worked 45 min. on Monday, 40 min. on Tuesday, 55 min. on Wednesday, 40 min. on Thursday, and 45 min. on Friday. That was _____ min. all together, or _____ hr. and _____ min.

5. At 40¢ an hour how much money should Ted have received for his 3 hr. and 45 min. of work?

6. Since Ted worked 225 min. in 5 da., what was the average number of minutes a day he worked?

7. Since Ted received \$1.50 in 5 da., what were his average daily earnings?

Problem Solving

1. Mary's mother gave her 20¢ and sent her to the store for $\frac{1}{2}$ lb. of cheese. When the grocer weighed the piece he had cut for her, he said: "This piece weighs 9 oz. Will that be all right?"

"Yes, if I have enough money to pay for it."

The cheese cost 32¢ a pound. Mary thought: There are 16 oz. in a pound. 9 oz. are $\frac{9}{16}$ of a pound. $\frac{9}{16}$ of a pound will cost $\frac{9}{16} \times 32¢$, or ____¢.

Had Mary enough money to pay for 9 oz. of cheese?

2. How much would Mary have had to pay for 4 oz. of cheese?
5 oz.? 7 oz.? 10 oz.? 12 oz.?

3. Jane needs 8 in. of velvet to trim a dress. The velvet costs \$3.60 a yard. What part of a yard does she need? How much will the piece cost her?

4. Roy needs 5 ft. 4 in. of wire netting for the pen he is building. At 12¢ a foot how much will the wire cost him?

5. Marie took care of Mrs. Burns's little girl, Helen, for 2 hours and 10 minutes yesterday and for an hour and 30 minutes today. How many hours was that?

6. Marie is paid 18¢ an hour for taking care of Helen. How much did she earn in taking care of her 3 hr. and 40 min.?

7. When Jean works in her father's candy store, children often come in and ask her for 5 cents' worth of candy. If the candy sells for 60¢ a pound, what part of a pound should she give them for 5¢? Tell what part of a pound she should give them for 5¢ if the candy sells for 40¢ a pound; 50¢; 70¢; 75¢; 20¢; 30¢.

8. What part of a pound of each kind of candy mentioned in Example 7 should she give for 10¢?

An Oral Test

Tell the words or numbers that belong in these blank spaces:

1. If you have \$1.50 with which to buy pansy plants that cost 8¢ each, you can buy ____ plants and have ____¢ left over.

2. When you speak of $\frac{3}{5}$ of an object, it means that you have in mind ____ of the ____ equal parts into which it has been divided (or could be divided).

3. Fractions must have a common denominator before they can be ____ or ____.

4. Fractions do not need a common denominator to be ____ or ____.

5. The distance around the outside of a rectangle, a triangle, or a square is called its ____.

6. The area of a rectangle is equal to the number of units in its ____ times the number of units (of the same kind) in its ____.

7. 1 sq. ft. = ____ sq. in. ; 1 sq. yd. = ____ sq. ft.

8. The area of a rectangle that is 12 in. wide and 4 ft. long is ____ sq. ft.

9. 12 sq. ft. equals ____ sq. yd.

11. $\frac{5}{12}$ is a ____ fraction.

10. $\frac{12}{5}$ is called an ____ fraction.

12. $1\frac{3}{5}$ is a ____ ____.

13. When mixed numbers are added, the ____ should be added first and then the ____ numbers should be added.

14. There are ____ ft. in a rod, and ____ ft. in a mile.

15. In subtracting $1\frac{3}{4}$ from 8 you should think of the 8 as ____.

16. The average of 8, 9, 12, 4, 5, and 2 is ____.

17. $\frac{8}{10}$ should not be given as the correct answer to an example, because it is not . . .

18. $\frac{9}{4}$ should not be given as the answer to an example, because it should be changed to a ____ ____.

19. To subtract $\frac{5}{8}$ from $3\frac{3}{8}$, you should think of the $3\frac{3}{8}$ as ____.

A Fraction Review

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $\frac{1}{3} = \frac{?}{6}$	$\frac{8}{12} = \frac{?}{3}$	$\frac{17}{5} = ?$	$1\frac{3}{5} = \frac{?}{5}$
2. $\frac{1}{2} = \frac{?}{10}$	$\frac{26}{7} = ?$	$\frac{20}{25} = ?$	$\frac{14}{21} = ?$
3. $\frac{18}{3} = ?$	$5\frac{5}{6} = \frac{?}{6}$	$\frac{8}{5} = ?$	$4\frac{2}{3} = \frac{?}{3}$
4. $\frac{12}{15} = \frac{?}{5}$	$\frac{3}{4} = \frac{?}{12}$	$5\frac{2}{3} = \frac{?}{3}$	$4\frac{2}{9} = \frac{?}{9}$
5. $\frac{24}{5} = ?$	$\frac{22}{4} = ?$	$\frac{2}{5} = \frac{?}{15}$	$\frac{18}{20} = ?$

Add:

6. $\frac{3}{4}$ $\frac{1}{8}$ <u>$\frac{1}{16}$</u>	7. $\frac{3}{5}$ $\frac{1}{4}$ <u>$\frac{1}{4}$</u>	8. $1\frac{2}{3}$ 3 <u>$2\frac{1}{4}$</u>	9. $3\frac{5}{8}$ $2\frac{3}{4}$ <u>$1\frac{1}{2}$</u>	10. $3\frac{4}{5}$ $2\frac{1}{2}$ <u>5</u>
---	--	--	---	---

Subtract:

11. $\frac{7}{8}$ <u>$\frac{1}{4}$</u>	12. $\frac{3}{5}$ <u>$\frac{1}{4}$</u>	13. $4\frac{5}{8}$ <u>$3\frac{1}{2}$</u>	14. $5\frac{1}{3}$ <u>$2\frac{2}{3}$</u>	15. $6\frac{1}{3}$ <u>$1\frac{5}{6}$</u>
--	--	--	--	--

Multiply:

16. $\frac{2}{3} \times \frac{3}{5}$	17. $\frac{5}{6} \times 8$	18. $8 \times 1\frac{2}{3}$
19. $3\frac{1}{3} \times \frac{2}{5}$	20. $4\frac{1}{6} \times 1\frac{1}{5}$	21. $2\frac{1}{2} \times \frac{1}{2}$

Divide:

22. $\frac{8}{9} \div \frac{2}{3}$	23. $\frac{4}{5} \div 4$	24. $6 \div \frac{2}{3}$
25. $2\frac{1}{4} \div 1\frac{1}{2}$	26. $3\frac{3}{4} \div 2\frac{1}{5}$	27. $2\frac{1}{4} \div \frac{1}{4}$
28. $5 \div \frac{1}{2}$	29. $5 \div \frac{1}{5}$	30. $5 \div \frac{1}{25}$
31. $\frac{1}{2} \div \frac{1}{4}$	32. $\frac{1}{2} \div \frac{1}{8}$	33. $\frac{1}{2} \div \frac{1}{2}$
34. $\frac{1}{4} \div \frac{1}{2}$	35. $\frac{1}{8} \div \frac{1}{2}$	36. $\frac{1}{2} \div 2$

Progress Test No. 6

Write just the answers to these examples on your paper. Number each answer. (Record your score.)

$$\begin{array}{r} 1. \ \$25.48 \\ 29.98 \\ 57.84 \\ 5.95 \\ .09 \\ \hline 2.63 \end{array}$$

$$\begin{array}{r} 2. \ 80000 \\ - 27654 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \ 759 \\ \times 406 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \ 543 \\ \times 8900 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \ \$467.89 \\ - 30.07 \\ \hline \end{array}$$

$$6. \ 267 \overline{)23229}$$

$$7. \ 75 \overline{)4803}$$

$$\begin{array}{r} 8. \ 3\frac{3}{4} \\ \frac{2}{5} \\ \hline 5\frac{1}{5} \end{array}$$

$$\begin{array}{r} 9. \ 3\frac{1}{6} \\ - 1\frac{3}{4} \\ \hline \end{array}$$

$$10. \ \frac{3}{4} \times \frac{8}{10} =$$

$$12. \ 1\frac{1}{3} \times 1\frac{7}{8} =$$

$$11. \ \frac{5}{6} \div \frac{10}{13} =$$

$$13. \ 2\frac{2}{3} \div 1\frac{1}{4} =$$

14. A farmer has a field 40 rd. long and 25 rd. wide. How many acres are there in the field?

15. If the farmer (Ex. 14) uses $1\frac{1}{2}$ bu. of wheat an acre, how many bushels of wheat will be needed to sow the whole field?

16. If jelly glasses are 3 for 10¢, how much will two dozen glasses cost?

17. If a box containing 3 dozen paper flowers costs \$1.80, how much does each flower cost?

18. If you buy $2\frac{1}{2}$ doz. rolls at 18¢ a dozen and $\frac{3}{4}$ lb. of ham at 60¢ a pound, how much money will you have left from a 2-dollar bill?

Standards: X, 16. Y, 13. Z, 10.

Finding Out What You Know and What You Don't Know

If you get any example wrong on this page, you need practice on that kind of example. You can find in the chart on the next page where to get that practice.

TEST I. ADDITION

- | | | | | | | | |
|----------|-------------|------------------|-------------------|-------------------|-------------------|------------------|--------------------|
| 1. 9 | 2. \$145.98 | 3. $\frac{3}{8}$ | 4. $\frac{1}{10}$ | 5. $\frac{1}{12}$ | 6. $\frac{27}{8}$ | 7. $\frac{3}{5}$ | 8. $6\frac{3}{10}$ |
| 7 | 75.97 | $\frac{1}{8}$ | $\frac{1}{5}$ | $\frac{3}{4}$ | $3\frac{1}{4}$ | $\frac{5}{6}$ | $8\frac{1}{4}$ |
| 6 | 8.75 | $\frac{1}{8}$ | $\frac{1}{2}$ | $\frac{1}{2}$ | | | $4\frac{1}{2}$ |
| 8 | 29.68 | | | | | | |
| 3 | <u>9.77</u> | | | | | | |
| 5 | | | | | | | |
| <u>4</u> | | | | | | | |

TEST II. SUBTRACTION

- | | | | | | |
|------------|---------------|------------------|-------------------|-------------------|---------------------|
| 1. 8000 | 2. \$569.83 | 3. $\frac{5}{6}$ | 4. $7\frac{7}{8}$ | 5. $4\frac{1}{3}$ | 6. $27\frac{1}{10}$ |
| <u>279</u> | <u>248.97</u> | $\frac{1}{3}$ | $2\frac{1}{4}$ | $2\frac{5}{6}$ | $23\frac{3}{5}$ |

TEST III. MULTIPLICATION

- | | | |
|-------------|------------|------------|
| 1. 254 | 2. 509 | 3. 754 |
| <u>2300</u> | <u>827</u> | <u>308</u> |

4. $1\frac{1}{2}$ doz. eggs at 48¢ a dozen will cost ____.

5. $\frac{1}{8}$ lb. cheese at 32¢ a pound will cost ____.

- | | | | |
|--|---|--|-----------------------------------|
| 6. $\frac{4}{5} \times \frac{1}{3} =$ | 7. $\frac{5}{6} \times 12 =$ | 8. $\frac{2}{5} \times 12 =$ | 9. $28 \times \frac{4}{7} =$ |
| 10. $\frac{2}{3} \times \frac{6}{7} =$ | 11. $6\frac{1}{3} \times \frac{2}{3} =$ | 12. $3\frac{1}{3} \times 5\frac{5}{8} =$ | 13. \$40
$\times 5\frac{2}{3}$ |

TEST IV. DIVISION

- | | | | |
|-----------------------------------|---------------------------|-------------------------------------|-------------------------|
| 1. $23 \overline{)69126}$ | 2. $19 \overline{)14284}$ | 3. $2700 \overline{)549600}$ | 4. $\frac{3}{4} \div 3$ |
| 5. $\frac{8}{9} \div \frac{1}{3}$ | 6. $5 \div \frac{3}{8}$ | 7. $6\frac{2}{3} \div 1\frac{2}{3}$ | |

The Practice You Need

If you failed any example in the tests on page 148, it shows that you need practice on that kind of examples. This chart will show you where to get that practice.

TEST I	TEST II	TEST III	TEST IV
1. p. 8, Exs. 1-8 2. p. 9, Test V 3. p. 41, Exs. 1-3 4. p. 41, Exs. 1-3 5. p. 60, Exs. 2-3 6. p. 61, Exs. 4-9 7. p. 80, Ex. 20 8. p. 87, Exs. 1-4	1. p. 12, Test IV 2. p. 12, Test V 3. p. 43, Exs. 4-5 4. p. 63, Exs. 6-7 5. p. 106, Exs. 3-6 6. p. 108, Exs. 5-7	1. p. 17, Test V 2. p. 17, Test V 3. p. 17, Test V 4. p. 121 5. p. 36 6. p. 115 7. p. 113 8. p. 118 9. p. 110 10. p. 117, Exs. 1-8 11. p. 122, Exs. 2-4 12. p. 120, Exs. 4-5 13. p. 121	1. p. 44 2. p. 69, Exs. 1-6 3. p. 91 4. p. 130, Exs. 4-15 5. p. 129, Exs. 5-9 6. p. 129, Exs. 1-4 7. p. 135

Just for Fun

Tom found these five pieces of chain and wanted to have them



joined together to make a chain for his dog. The blacksmith told him he would charge him 1¢ to cut a link and 3¢ to weld a link, and so it would cost him 16¢ to do the job.

Tom said, "You could do it so that my bill would be only 12¢."

The blacksmith said, "How do you figure that?"

Can you show that Tom was right?

CHAPTER VII

DECIMALS

Tenths of a Foot

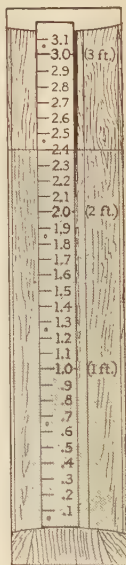
(1) Albert was visiting his uncle's farm and had climbed up to a large water tank. His uncle called to him: "Albert, how deep is the water in the tank?"

(2) Albert noticed that the space from the 2-foot mark to the 3-foot mark was divided into 10 equal parts. He thought: "Each of those must be $\frac{1}{10}$ of a foot. 2.1 must mean $2\frac{1}{10}$ ft., 2.2 must mean $2\frac{2}{10}$ ft., etc." So he called back, "I think it is $2\frac{4}{10}$ ft. deep." Do you think that was right?

(3) Albert's uncle explained to him that the dot in 2.4 is called a *decimal point*. The number 2.4 is called a *decimal*. Any number containing a decimal point is called a decimal. The number .4 is a *decimal*. It means $\frac{4}{10}$. 1.4 is read "one and four tenths."

(4) How deep would the water be if it were on a level with 2.3? 2.7? 1.4? 1.1? 1.0? .9? .6? .1?

Notice that 1.0 means $1\frac{0}{10}$, 2.0 means $2\frac{0}{10}$, and so on.



Express as decimals:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>
1.	$\frac{3}{10}$	$\frac{2}{10}$	$\frac{7}{10}$	$\frac{5}{10}$	$\frac{6}{10}$	$\frac{8}{10}$	$\frac{9}{10}$	$\frac{1}{2}$
2.	$1\frac{1}{10}$	$1\frac{2}{10}$	$1\frac{5}{10}$	$2\frac{1}{10}$	$2\frac{7}{10}$	$3\frac{4}{10}$	$5\frac{6}{10}$	$7\frac{8}{10}$

Express as mixed numbers or fractions:

3.	3.8	2.6	7.6	.4	10.3	11.6	12.6	.8
4.	.7	3.9	4.0	2.5	.5	12.2	16.6	.9

Decimals

1. What part of a dollar is 1¢? 2¢? 3¢? 29¢? 39¢? 57¢?
2. When we write 1¢ like this, \$.01, we mean *one hundredth* of a dollar. What do we mean when we write \$.02? \$.03? \$.07? \$.09? \$.17? \$.57? \$.75? \$.99?
3. When we write .01 of an inch, we mean one hundredth of an inch. What do we mean when we write .02 of an inch? .03 of an inch? .08 of a second? .09 of a second? .35 of a foot? .50 of a foot? .09 sec.? .50 ft.?
4. Which is most, $\frac{1}{2}$ lb., .5 lb., or .50 lb.?
5. Which is most, $\frac{1}{2}$ dollar, .5 dollar, or .50 dollar?

What numbers belong in these blank spaces?

6. .90, .91, .92, —, —, —, —, —, —, .99, 1.00.
7. .10, .20, .30, —, —, —, —, —, —, 1.00.
8. .75, .80, .85, —, —, —, —, —, —, 1.20.
9. 1.20 is 120 hundredths, but it is always read "1 and 20 hundredths." How is 1.25 read?
10. How should you read 2.35? 2.40? 2.45? 2.50?

Read these decimals:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
11.	.25	6.35	9.90	4.3	4.08
12.	3.25	8.06	9.09	2.03	4.8
13.	5.07	50.05	50.50	5.5	50.5

Write these numbers in decimal form:

14.	$2\frac{3}{10}$	$4\frac{25}{100}$	$81\frac{75}{100}$	$7\frac{4}{100}$	$563\frac{3}{10}$
15.	$4\frac{6}{10}$	$5\frac{16}{100}$	$\frac{35}{100}$	$\frac{8}{100}$	$279\frac{5}{100}$
16.	$8\frac{1}{10}$	$29\frac{18}{100}$	$\frac{5}{10}$	$\frac{9}{10}$	$705\frac{2}{100}$

Reading Decimals

Read each of these numbers:

- | | | | |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| 1. 43.8
43.9
44.0
44.1 | 2. 23.2
23.1
23.0
22.9 | 3. 67.6
68.8
70.0
72.2 | 4. 89.4
89.7
90.0
90.3 |
| 5. 454.
45.4
4.54 | 6. 7.63
76.3
763. | 7. 404.
40.4
4.04 | 8. 240.
24.0
2.40 |

Hundreds	Tens	Units	Decimal point	Tenths	Hundredths	Thousandths
5	6	7	.	2	3	9

9. The number above is read *567 and 239 thousandths*.
10. The tenths place is the ____ place to the right of the decimal point.
11. The hundredths place is the ____ place to the right of the decimal point.
12. The thousandths place is the ____ place to the right of the decimal point.
13. .4 is read 4 ____.
14. .04 is read 4 ____.
15. .004 is read 4 ____.
16. .47 is read 47 ____.
17. .047 is read 47 ____.
18. 3.056 is read 3 and 56 ____.

Read these numbers:

- | | | | |
|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 19. 4768.
476.8
47.68
4.768 | 20. 5.361
53.61
536.1
5361. | 21. 5804.
580.4
58.04
5.804 | 22. 6005.
600.5
60.05
6.005 |
|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|

Decimals

Tell which is greater in each of the following:

1. \$2.50 or \$250
2. 23.2 yd. or 232 yd.
3. 7.93 acres or 79.3 acres
4. .764 ft. or 7.64 ft.
5. .75 lb. or 7.5 lb.
6. 6.04 tons or 60.4 tons
7. .356 in. or 356 in.
8. 8.76 rd. or 87.6 rd.
9. 56.42 min. or 5.642 min.
10. 3.987 mi. or 398.7 mi.
11. 6.307 hr. or 63.07 hr.
12. 50.09 degrees or 5.009 degrees

13. Can the fraction $\frac{40}{100}$ be reduced to $\frac{4}{10}$? By what do you divide both numerator and denominator?

14. Can the fraction $\frac{400}{1000}$ be reduced to $\frac{4}{10}$? By what do you divide both numerator and denominator?

15. Does $\frac{400}{1000} = \frac{40}{100} = \frac{4}{10}$?

16. Does $.400 = .40 = .4$?

17. Is 3.40 equal to 3.4? (Can $3\frac{40}{100}$ be reduced to $3\frac{4}{10}$?)

18. Is 7.800 equal to 7.8? (Can $7\frac{800}{1000}$ be reduced to $7\frac{8}{10}$?)

19. Which is largest, 6.8, 6.80, or 6.800?

20. Compare 70.30, 70.300, and 70.3.

A zero or zeros may be annexed to or erased from the end of a decimal fraction without changing the value of the fraction.

Name the largest and the smallest number in each of these groups:

- | | | | |
|-----------|-----------|-----------|------------|
| 21. 70.25 | 22. 8.008 | 23. 95.01 | 24. 608.04 |
| 702.5 | 800.8 | 9.501 | 60.804 |
| 7025. | 80.08 | 950.1 | 6080.4 |

Tell all the correct answers in the following:

25. $2\frac{1}{2} = (2.5; 2\frac{5}{10}; 2\frac{50}{100}; 2.05; 2.50; 2.500; \frac{5}{2}).$

26. $2\frac{1}{10} = (2.1; 2.10; 2.100; 2.01; \frac{21}{10}).$

Counting

Miss King asked the children in the fifth grade to begin with 3 tenths and count by 2 tenths until she told them to stop. They wrote the numbers on their papers.

Martha wrote this: .3 .5 .7 .9 .11 .13 .15

Dean wrote this: .3 .5 .7 .9 1.1 1.3 1.5

Which one do you think was right?

Dean said he could prove that he was right. This is the way he did it. Do you think that proves that Dean was right?

$\frac{11}{10} = 1\frac{1}{10} = 1.1$
$\frac{13}{10} = 1\frac{3}{10} = 1.3$
$\frac{15}{10} = 1\frac{5}{10} = 1.5$

Tell the numbers that belong in each of these spaces from D to K. The first two rows have been filled in for you.

	A	B	C	D	E	F	G	H	I	J	K
1.	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9	5.1	5.3	5.5
2.	7.4	7.8	8.2	8.6	9.0	9.4	9.8	10.2	10.6	11.0	11.4
3.	5.5	5.6	5.7								6.5
4.	6.2	6.4	6.6								8.2
5.	7.3	7.6	7.9								10.3
6.	6.4	6.8	7.2								10.4
7.	5.5	5.8	6.1								8.5
8.	3.41	3.43	3.45								4.61
9.	2.42	2.52	2.62								3.42
10.	3.34	3.39	3.44								3.84
11.	7.02	7.04	7.06								7.22

12. Can you find an error in this counting?

2.54 2.84 3.14 3.44 3.84

13. Can you write $2\frac{3}{100}$ as a decimal? George wrote 2.3 and Harry wrote 2.03. Who was right?

14. Write as decimals: $2\frac{7}{10}$; $2\frac{7}{100}$; $3\frac{9}{10}$; $3\frac{9}{100}$; $4\frac{3}{10}$; $4\frac{3}{100}$.

Practice with Decimals

1. Is two and five hundredths written 2.5, 2.05, or 2.50?
2. Is six and twenty-five hundredths written 6.25, 6.025, or 62.5?
3. Is one hundred and sixteen hundredths written 100.016, 100.16, or 116.00?
4. Is $9\frac{77}{100}$ written 97.7, 9.077, or 9.77?
5. Is $\frac{28}{100}$ written 28, 2.8, or .28?
6. Is $7\frac{7}{10}$ written 77 or 7.7 or 7.07?
7. Is $\frac{1}{100}$ written 1.00, .100, or .01?
8. Is $\frac{2}{100}$ written .02, .200, or .20?
9. Is .008 read eight tenths, eight hundredths, or eight thousandths?
10. Is 4.400 equal to $4\frac{4}{100}$, $4\frac{4}{10}$, or $4\frac{4}{1000}$?
11. Is 10.08 equal to $10\frac{8}{10}$, $10\frac{8}{1000}$, or $10\frac{8}{100}$?
12. Is 99.99 equal to $99\frac{99}{100}$, $999\frac{9}{10}$, or $9\frac{999}{1000}$?
13. Is 3.056 equal to $3\frac{56}{100}$, $3\frac{56}{1000}$, or $30\frac{56}{100}$?

Write each of the following in decimal form:

- | | | | | |
|----------------------|-----------------------|----------------------|----------------------|---------------------|
| 14. $6\frac{5}{10}$ | 16. $3\frac{56}{100}$ | 18. $7\frac{5}{10}$ | 20. $\frac{5}{100}$ | 22. $\frac{1}{10}$ |
| 15. $\frac{56}{100}$ | 17. $23\frac{8}{10}$ | 19. $\frac{55}{100}$ | 21. $7\frac{2}{100}$ | 23. $\frac{1}{100}$ |

24. Seven tenths.
25. Seven hundredths.
26. Seven thousandths.
27. Five hundred and five hundredths.
28. Three thousand and three thousandths.
29. Three thousand three and three thousandths.
30. Four thousand three hundred and twenty-one hundredths. (Be careful!)

Telling What You Think

1. Bobby bought a dozen oranges for 60¢. Billy asked him if he would sell him one orange. Bobby said he would. To find out how much to charge for one orange, Bobby thought, "12 oranges cost 60¢; so one orange costs $\frac{1}{12}$ of 60¢, or ____ cents."

Tell what you think as you solve these problems:

2. At 3 for 5¢ a dozen plums will cost ____ cents.

3. Jim did 5 of his home-work problems in 8 minutes. At that rate it will take him ____ minutes to do all 12 of his home-work problems.

4. If a box containing $\frac{1}{4}$ lb. of candy costs 25¢, a pound of the same kind of candy will cost ____ cents.

5. At 15¢ an hour it will take you ____ hours to earn 75¢.

6. If you now live $\frac{1}{2}$ mile from school, but expect to move to a new house that is $\frac{7}{8}$ of a mile from school, you will have to walk ____ of a mile farther in going to school, and ____ of a mile farther coming home, or ____ of a mile farther each day.

7. My mother paid 12¢ for a 2-ounce can of tea. My father asked her why she didn't buy 1-pound cans for 80¢. She said, "Why, that would save ____ cents on every pound, wouldn't it?"

8. Harry saw some oranges marked "3 for 10¢." He bought 4 doz. of them and sold them to his neighbors for 50¢ a dozen. How much did he gain on the transaction?

9. One week I worked 6 hr. 40 min. at a grocery store. The merchant agreed to pay me \$.40 an hour. He gave me \$2.55 for the week's work. Was that the right amount?

10. At 4 for 5 cents, what would 3 dozen bolts cost?

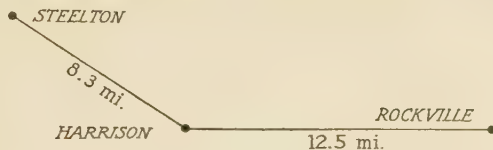
11. If I can run 80 ft. in 4 seconds, at the same rate I can run 40 ft. in ____ seconds.

Adding Decimals

1. Looking at the map, can you tell how far it is from Steelton to Harrison?

2. How far is it from Harrison to Rockville?

8.3 miles
12.5 miles
20.8 miles



3. Following the road shown on the map, how far is it from Steelton to Rockville?

4. Do you think that decimals are added in the same way that dollars and cents are added?

When you add decimals, be sure that the decimal points are written one under the other. (Any whole number may be thought of as followed by a decimal point.) Write the decimal point in the answer under the decimal points in the addends.

Write the sums in these examples:

5. 5.60	6. 3.67	7. 2.35	8. 4.404	9. 3.62	10. 3.56
4.14	4.89	6.5	.40	5.73	8.21
3.18	.10	7.6	.04	.11	.57
<u>2.77</u>	<u>1.05</u>	<u>4.98</u>	<u>40.004</u>	<u>67.45</u>	<u>4.</u>

Write in column form and find the sums in the following examples: (Remember that you are to write all decimal points one under the other when you add.)

- | | |
|-----------------------------------|-------------------------|
| 11. $.4 + .3$ | 15. $.2 + .22 + .222$ |
| 12. $.04 + .76$ | 16. $1.2 + 3.46 + .22$ |
| 13. $.276 + .145$ | 17. $3.5 + 2.75 + 1.7$ |
| 14. $.1 + .01 + .001$ | 18. $.60 + 3.754 + 6.6$ |
| 19. $53.0 + 5.35 + 46.28 + 27.54$ | |

An Automobile Trip *

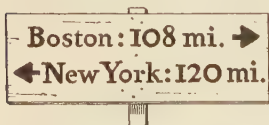
The number under the name of each city on this road map tells the number of miles it is from New Haven, Connecticut.

(1) The other day we started to drive from New Haven to Berlin, a distance of ____ miles. When we reached Berlin, my father said: "Let's go on to Hartford; it is only ____ miles farther. I'm driving about 25 miles an hour; so it will take us less than ____ hour to go up there."

(2) My sister goes to college at Northampton. When we reached Hartford, I begged my father to go on to see her. It is only ____ miles farther, and at the rate he was driving, it would take less than ____ hours to get there.

(3) It was then 11 A.M. My father said: "I must be back home by 3:30 P.M. From here to Northampton and then back home is ____ miles. I'll go if I have time. Have I?"

(4) I estimated that to drive 125.4 miles would take about ____ hours, and since he had to be back in ____ hours, I answered, "____."

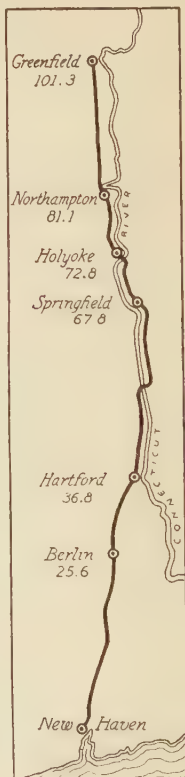


(5) At Hartford I saw this sign. I figured it must be ____ miles from New York to Boston.

(6) Our car goes about 15 mi. on one gallon of gas; so on our trip to Hartford and back we must have used almost ____ gallons of gas.

(7) My father paid 22¢ a gallon for gasoline that day; so the amount we used on our trip must have cost ____.

(8) We had 10 gallons of gasoline put into the car before we started on our trip that day, and there must have been ____ gallons of it left after the trip.



Subtracting Decimals

Frank won first place in a 100-yard dash in 10.6 sec. George took second place in 10.8 sec. Ben took third place in 11.2 sec.

$$\begin{array}{r} 10.8 \text{ sec.} \\ 10.6 \text{ sec.} \\ \hline .2 \text{ sec.} \end{array}$$

Frank beat George by ____ sec.

George beat Ben by ____ sec.

$$\begin{array}{r} 11.2 \text{ sec.} \\ 10.8 \text{ sec.} \\ \hline .4 \text{ sec.} \end{array}$$

When you subtract decimals, be sure that the decimal points are written one under the other. Write the decimal point in the answer right under the others.

Do these subtractions: (Check each one.)

1. $\begin{array}{r} 3.54 \\ 2.29 \\ \hline \end{array}$	2. $\begin{array}{r} 3.5 \\ 2.6 \\ \hline \end{array}$	3. $\begin{array}{r} 7.54 \\ 3.08 \\ \hline \end{array}$	4. $\begin{array}{r} 9.76 \\ 5.43 \\ \hline \end{array}$	5. $\begin{array}{r} 8.75 \\ 3.2 \\ \hline \end{array}$	6. $\begin{array}{r} 9.86 \\ 5.5 \\ \hline \end{array}$
--	--	--	--	---	---

7. $\begin{array}{r} 4.798 \\ 3.26 \\ \hline \end{array}$	8. $\begin{array}{r} 7.584 \\ 3.27 \\ \hline \end{array}$	9. $\begin{array}{r} 6.504 \\ .29 \\ \hline \end{array}$	10. $\begin{array}{r} 5.805 \\ .374 \\ \hline \end{array}$	11. $\begin{array}{r} 10.28 \\ 9.1 \\ \hline \end{array}$	12. $\begin{array}{r} 12.65 \\ 9.4 \\ \hline \end{array}$
---	---	--	--	---	---

13. When you want to subtract three dollars and forty-two cents from five dollars, how do you write the example?

14. When you want to subtract 3.42 from 5, how do you think you should write the example?

15. When you want to subtract 2.82 from 5.4, will you write

your example like this: $\begin{array}{r} 5.4 \\ 2.82 \\ \hline \end{array}$ or like this: $\begin{array}{r} 5.40 \\ 2.82 \\ \hline \end{array}$? Why?

When the minuend is a whole number or has fewer decimal places than the subtrahend, zeros should be annexed at the right until there are as many decimal places in the minuend as in the subtrahend.

16. Do these subtractions.

a. $\begin{array}{r} 3.5 \\ 2.468 \\ \hline \end{array}$	b. $\begin{array}{r} 4.64 \\ 2.897 \\ \hline \end{array}$	c. $\begin{array}{r} 5. \\ 2.63 \\ \hline \end{array}$	d. $\begin{array}{r} 7. \\ 2.05 \\ \hline \end{array}$	e. $\begin{array}{r} 8.2 \\ 7.25 \\ \hline \end{array}$	f. $\begin{array}{r} 9.73 \\ .008 \\ \hline \end{array}$
--	---	--	--	---	--

Practice with Decimals

1. Harold has a pedometer which shows how far he walks each day. On Monday he walked 6.5 miles, Tuesday 5.8 miles, and Wednesday 6.9 miles. How far did he walk in the three days?

2. How much farther did Harold walk on Monday than on Tuesday?

3. The record for the 220-yd. dash at the Wilson School had been 29.2 sec. This year Ted Brown ran it in 28 sec. In how much less time did he run it than it had been done before?

4. The record at the Roosevelt School for the 220-yd. dash is 27.8 sec. How much better is that than Ted's record?

5. How much change would you get from five 10-dollar bills if you bought a chair for \$29.49 and a lamp for \$14.75?

Subtract:

- | | | |
|-------------------|--------------------|---------------------|
| 6. $10.56 - 2.5$ | 12. $7 - 6.48$ | 18. $9 - .25$ |
| 7. $12.4 - 3.25$ | 13. $7.54 - 5$ | 19. $9.56 - 3.845$ |
| 8. $6.48 - 2.97$ | 14. $8.76 - 5.5$ | 20. $10.1 - 10.01$ |
| 9. $5.65 - 3.254$ | 15. $3.82 - 2.987$ | 21. $20.75 - 2.075$ |
| 10. $2.75 - 1.39$ | 16. $.754 - .25$ | 22. $63. - 50.05$ |
| 11. $5 - 2.52$ | 17. $.806 - .7$ | 23. $4.75 - 2.635$ |

24. Add: $2.5 + 4 + 3.4 + 5.2 + 3.25 + 43$

25. Add: $1 + .1 + 1.1 + .11 + .01 + 1.11$

26. Find: $2.3 + 2.3 + 2.3 + 2.3 + 2.3 + 2.3$

27. Find: $1.5 + 1.5 + 1.5 + 1.5 + 1.5 + 1.5 + 1.5$

28. Subtract: $2798 - 276.5$

29. Subtract: $7562 - 100.6$

30. Complete: .96, .97, —, —, —, —, 1.02

Train Schedules *

The numbers in the first column tell how many miles it is from New York to each of the stations on the list. It is 8.1 miles from New York to Harrison; 8.8 miles from New York to Newark; 8.8 miles from New York to Roseville Avenue; 8.8 miles from New York to Grove Street; 8.8 miles from New York to East Orange; 8.8 miles from New York to Highland Avenue; 8.8 miles from New York to South Orange; 8.8 miles from New York to Maplewood; 8.8 miles from New York to Millburn; 8.8 miles from New York to Short Hills; 8.8 miles from New York to Summit; 8.8 miles from New York to Madison; 8.8 miles from New York to Convent; 8.8 miles from New York to Morristown; 8.8 miles from New York to Denville; 8.8 miles from New York to Port Morris; 8.8 miles from New York to Waterloo; 8.8 miles from New York to Hackettstown; 8.8 miles from New York to Washington; and so on.

Distances from New York	Between NEW YORK and	One-Way Fares
8.1	Harrison	\$.30
8.8	Newark	.33
10.0	Roseville Ave.	.36
10.6	Grove St.	.39
11.0	East Orange	.40
13.2	Highland Ave.	.48
14.9	South Orange	.54
16.2	Maplewood	.59
17.8	Millburn	.65
18.8	Short Hills	.69
21.1	Summit	.77
26.5	Madison	.96
28.7	Convent	1.05
30.8	Morristown	1.12
37.3	Denville	1.26
47.5	Port Morris	1.72
52.2	Waterloo	1.89
57.8	Hackettstown	2.09
67.6	Washington	2.44

1. How far is it from New York to Roseville Avenue?
2. From Newark to Summit?
3. Grove Street to Summit?
4. Millburn to Convent?
5. Morristown to Denville?
6. Convent to Denville?
7. Port Morris to Madison?
8. Denville to Short Hills?
9. Waterloo to Summit?
10. Convent to Newark?
11. Morristown to Summit?

12. The numbers in the right-hand column tell the fare from New York to each of the stations on the list. How much does it cost to go from New York to Harrison? to Newark?

How much does it cost to go from:

13. South Orange to Madison? to Denville?
14. Highland Avenue to Convent? to Morristown?
15. Hackettstown to Morristown? to Harrison?

Without using a pencil, find how much you would have to pay for a return-trip ticket from New York to:

- | | | |
|-----------------|----------------|-----------------|
| 16. Newark | 19. Summit | 22. Denville |
| 17. East Orange | 20. Convent | 23. Port Morris |
| 18. Maplewood | 21. Morristown | 24. Washington |

Changing Decimals to Fractions

Tell the missing numbers:

- | | | |
|--------------------------------------|--|--|
| 1. $.1 = \frac{?}{10}$ | 6. $.05 = \frac{?}{100} = \frac{?}{20}$ | 11. $4.5 = 4\frac{5}{10} = 4\frac{1}{2}$ |
| 2. $.2 = \frac{?}{10} = \frac{?}{5}$ | 7. $.25 = \frac{?}{100} = \frac{?}{4}$ | 12. $6.8 = 6\frac{8}{10} = 6\frac{4}{5}$ |
| 3. $.3 = \frac{?}{10}$ | 8. $.75 = \frac{?}{100} = \frac{?}{4}$ | 13. $7.2 = 7\frac{2}{10} = 7\frac{1}{5}$ |
| 4. $.4 = \frac{?}{10} = \frac{?}{5}$ | 9. $.50 = \frac{?}{100} = \frac{?}{2}$ | 14. $9.4 = 9\frac{4}{10} = 9\frac{2}{5}$ |
| 5. $.5 = \frac{?}{10} = \frac{?}{2}$ | 10. $.60 = \frac{?}{100} = \frac{?}{10}$ | 15. $3.5 = 3\frac{5}{10} = 3\frac{1}{2}$ |

16. Change to fractions or mixed numbers:

- | | | | | | | |
|-------|-------|--------|--------|--------|--------|---------|
| a. .6 | c. .8 | e. 4.6 | g. 3.8 | i. .05 | k. .35 | m. 7.05 |
| b. .7 | d. .9 | f. 5.7 | h. 2.9 | j. .15 | l. .40 | n. 8.15 |

17. Write as decimals: $5\frac{3}{10}$; $5\frac{3}{100}$; $5\frac{3}{1000}$.

18. Write as decimals: $4\frac{5}{10}$; $4\frac{5}{100}$; $4\frac{5}{1000}$.

19. Write as mixed numbers: 2.4; 2.04; 1.5; 1.05.

20. Subtract two and five hundredths from two and five tenths.

A MATCHING CONTEST

In the *A* columns are decimals. In the *B* columns are fractions. Find the fractions in the *B* columns that match the decimals in the *A* columns.

<i>A</i>	<i>B</i>
1. .2	a. $\frac{4}{5}$
2. .8	b. $\frac{3}{4}$
3. .5	c. $\frac{1}{2}$
4. .25	d. $\frac{2}{5}$
5. .75	e. $\frac{1}{4}$
6. .30	f. $\frac{1}{5}$
7. .40	g. $\frac{3}{10}$
8. .60	h. $\frac{3}{5}$

<i>A</i>	<i>B</i>
9. 4.5	i. $4\frac{1}{4}$
10. 4.80	j. $4\frac{3}{4}$
11. 4.25	k. $4\frac{1}{2}$
12. 4.75	l. $4\frac{2}{5}$
13. 4.45	m. $4\frac{4}{5}$
14. 4.2	n. $4\frac{9}{20}$
15. 4.4	o. $4\frac{1}{5}$
16. 4.35	p. $4\frac{7}{20}$

Changing Fractions to Decimals

(1) The principal of the Webster School sent around a notice asking each teacher in his building to report what part of the children in her room had not been absent or tardy during the month. This is the way the teachers reported what he asked for. Notice that some used decimals and some used fractions.

GRADE	NEITHER ABSENT NOR TARDY
Kind'n	.60
I	.70
II	$\frac{3}{4}$
III	$\frac{7}{10}$
IV	.80
V	$\frac{4}{5}$
VI	$\frac{7}{8}$
VII	$\frac{2}{3}$
VIII	.90

(2) He could not compare the reports of the various rooms unless they were all expressed in the same way; so he decided to change all the fractions to decimals.

(3) To change $\frac{3}{4}$ to a decimal, he thought, " $\frac{3}{4} = 3 \div 4$." He divided 3 by 4 this way: $\rightarrow$

$$\begin{array}{r} 4 \overline{)3.00} \\ \underline{.75} \end{array}$$

(4) To change $\frac{7}{10}$ to a decimal, he thought, " $\frac{7}{10} = 7 \div 10$." He divided 7 by 10 this way: $\rightarrow$

$$\begin{array}{r} 10 \overline{)7.00} \\ \underline{.70} \end{array}$$

(5) Change $\frac{4}{5}$, $\frac{7}{8}$, and $\frac{2}{3}$ to decimals in the same way.

(6) Which grade made the best record? the poorest?

To change a fraction to a decimal, place a decimal point after the numerator, annex one or more zeros, and divide by the denominator.

1. Change these fractions to decimals:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>
$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{1}{3}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{3}{8}$	$\frac{1}{10}$	$\frac{3}{10}$

Suppose you wish to change $4\frac{1}{2}$ to a decimal. You think, " $\frac{1}{2} = .5$; so $4\frac{1}{2} = 4.5$."

2. Change the following to decimals:

<i>a.</i> $6\frac{3}{4}$	$(\frac{3}{4} = 3 \div 4 = .75; \text{ so } 6\frac{3}{4} = 6.75)$										
<i>b.</i> $2\frac{1}{8}$	<i>c.</i> $3\frac{1}{5}$	<i>d.</i> $5\frac{3}{8}$	<i>e.</i> $6\frac{2}{3}$	<i>f.</i> $7\frac{5}{8}$	<i>g.</i> $5\frac{7}{8}$						

Multiplying Decimals

1. If you can drive a car at the rate of 23.1 miles an hour, how far can you go in 2.2 hours? Marie had this problem in a test. She multiplied and then wondered where to put the decimal point. She thought: "A number a little larger than 23 multiplied by a number a little larger than 2 must give an answer a little larger than 2×23 , or 46. If I put the decimal point between the 8 and the 2, my answer will be 508.2 miles. That is very much more than 46. If I put it between the 0 and the 8, my answer will be 50.82 miles. That is just a little more than 46; so I suppose that is where the decimal point belongs." Do you agree with Marie?

$$\begin{array}{r} 23.1 \\ 2.2 \\ \hline 462 \\ 462 \\ \hline 5082 \end{array}$$

2. Where do you think the decimal point should be placed in this example? Think: "A number a little larger than 3 multiplied by a number a little larger than 1 must give an answer a little larger than 1×3 , or ____."

$$\begin{array}{r} 3.22 \\ 1.5 \\ \hline 1610 \\ 322 \\ \hline 4830 \end{array}$$

3. Multiply these numbers. A number a little more than 45 multiplied by a number a little less than 1 should be about as much as 1×45 , or _____. Where should you place the decimal point in the answer?

$$\begin{array}{r} 45.1 \\ .9 \\ \hline \end{array}$$

Do you think the decimal points are placed correctly in these examples? Why?

4.
$$\begin{array}{r} 25.6 \\ 7 \\ \hline 179.2 \end{array}$$

5.
$$\begin{array}{r} 25.6 \\ .7 \\ \hline 17.92 \end{array}$$

6.
$$\begin{array}{r} 2.56 \\ 7 \\ \hline 17.92 \end{array}$$

7.
$$\begin{array}{r} 2.56 \\ .7 \\ \hline 1.792 \end{array}$$

8. On the next page is a rule that a fifth-grade pupil made up to help him tell quickly where to place the decimal point when he multiplied decimals. Do you think it is a good rule?

Multiplying Decimals

When multiplying decimals, point off from the right in the product as many decimal places as there are decimal places in both the multiplicand and multiplier together.

9. In each example from 1 to 7 on page 164, tell how many decimal places there are (a) in the multiplicand; (b) in the multiplier; (c) in both together; (d) in the answer.

There is at least one mistake in each of these examples. Can you find all of them?

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
10.	$\begin{array}{r} .25 \\ .6 \\ \hline 1.50 \end{array}$	$\begin{array}{r} 1.24 \\ 7 \\ \hline 8.48 \end{array}$	$\begin{array}{r} 3.25 \\ .5 \\ \hline 15.25 \end{array}$	$\begin{array}{r} 4.384 \\ 2 \\ \hline 87.68 \end{array}$
11.	$\begin{array}{r} 68.59 \\ 7.5 \\ \hline 34295 \\ 48013 \\ \hline 5144.25 \end{array}$	$\begin{array}{r} 5.08 \\ .25 \\ \hline 2540 \\ 1016 \\ \hline 127.00 \end{array}$	$\begin{array}{r} 5.67 \\ 30.9 \\ \hline 5103 \\ 1701 \\ \hline 22.113 \end{array}$	$\begin{array}{r} 40.5 \\ .35 \\ \hline 2025 \\ 1215 \\ \hline 1417.5 \end{array}$

Multiply and check by going over your work:

- | | | |
|------------------------|------------------------|----------------------|
| 12. 45.2×34.6 | 18. $37 \times .25$ | 24. $.2 \times 1.3$ |
| 13. 5.9×46.8 | 19. 7×2.356 | 25. $.3 \times 1.1$ |
| 14. 37.5×20.6 | 20. 9×87.54 | 26. $.3 \times .4$ |
| 15. 4.95×26.8 | 21. 20×8.546 | 27. $10 \times .1$ |
| 16. $2.9 \times .24$ | 22. 3.5×863 | 28. 10×1.1 |
| 17. $.75 \times 50.7$ | 23. 85.9×4.08 | 29. 10×11.1 |

30. Find the area of a rectangle 8.5 ft. wide and 9.4 ft. long.

31. If a train travels 38.5 miles an hour, how far can it go in 3.5 hours?

Multiplying Decimals

(1) Can you multiply .25 by .3? The first thing Jean did in this multiplication was to multiply the 25 by 3. Then her work looked like this: $\longrightarrow$

.25
.3
75

(2) She thought: "There are two decimal places in the multiplicand and one in the multiplier. Two and one are three; so I must point off three places in the answer."

(3) Then Jean was stuck. She didn't see how she could point off 3 places in the answer when there were only 2 figures. What would you have done if you had been in Jean's place?

(4) She asked the teacher for help and the teacher said: "Change your decimals to fractions. Then multiply and see what you get."

(5) Jean wrote this: $.25 = \frac{25}{100}$; $.3 = \frac{3}{10}$; $\frac{25}{100} \times \frac{3}{10} = \frac{75}{1000}$.

(6) Then she said: "Oh! My answer should be $\frac{75}{1000}$. I know what I can do. I'll put a 0 in front of the 75. Then, after I point off the three places, my example will look like this: $\longrightarrow$

My answer is 75 thousandths, as my multiplication of fractions shows it should be."

.25
.3
.075

(7) Jean's teacher said that was correct. Then she gave her this rule. Do you understand it?

When there are more decimal places to be pointed off than there are figures in the product, write as many zeros in front of the number as are needed to make the required number of decimal places.

$$.2 \times .3 = .06$$

$$.4 \times .22 = .088$$

Multiply:

1. $.02 \times .75$

3. $3 \times .024$

5. $.4 \times .02$

7. $.3 \times .17$

2. $.3 \times .28$

4. $.4 \times .22$

6. $5 \times .001$

8. $.5 \times .032$

Practice with Decimals

Copy and multiply: (Check by going over your work.)

- | | |
|-----------------------|------------------------|
| 1. 75×2.56 | 9. 5.8×756.9 |
| 2. $.35 \times 2$ | 10. $.9 \times 4.65$ |
| 3. 3.9×25.6 | 11. $.25 \times 2.56$ |
| 4. 3.08×456 | 12. 9.8×54.6 |
| 5. 2.75×304 | 13. $.73 \times 47.5$ |
| 6. 2.7×9.68 | 14. 98×5.67 |
| 7. 60.9×45.7 | 15. 5.4×28.9 |
| 8. $.98 \times 27.8$ | 16. 25.6×87.9 |

Change to proper fractions or mixed numbers:

- | | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | <i>e</i> | <i>f</i> | <i>g</i> | <i>h</i> | <i>i</i> | <i>j</i> |
|-----|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 17. | .5 | .75 | .25 | 9.4 | 3.6 | 2.15 | .35 | .40 | 7.05 | 3.9 |

Change these fractions to decimal form:

- | | | | | | | | | | | |
|-----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|
| 18. | $\frac{3}{8}$ | $\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{1}{4}$ | $\frac{2}{3}$ | $\frac{1}{8}$ | $\frac{3}{8}$ | $2\frac{5}{8}$ | $3\frac{7}{8}$ | $4\frac{1}{6}$ |
|-----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|

Add and check:

19. $2.5 + 3.05 + 4.79 + 25.06 + 27.75$
20. $3.94 + 3.095 + 2.796 + 3.054 + 9.87$
21. $.596 + .27 + .059 + 25.86 + 26.954$
22. $75.6 + 28.35 + .07 + .09 + 2.08$

Subtract and check:

- | | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | <i>e</i> |
|-----|--|--|--|---|--|
| 23. | $\begin{array}{r} 36.8 \\ 25.9 \\ \hline \end{array}$ | $\begin{array}{r} 37.45 \\ 8.67 \\ \hline \end{array}$ | $\begin{array}{r} 35.98 \\ 4.97 \\ \hline \end{array}$ | $\begin{array}{r} 56.82 \\ 49.93 \\ \hline \end{array}$ | $\begin{array}{r} 75.806 \\ 9.705 \\ \hline \end{array}$ |
| 24. | $\begin{array}{r} 75.63 \\ 9.87 \\ \hline \end{array}$ | $\begin{array}{r} 56.32 \\ .79 \\ \hline \end{array}$ | $\begin{array}{r} 65.32 \\ 8.88 \\ \hline \end{array}$ | $\begin{array}{r} 70.03 \\ 9.99 \\ \hline \end{array}$ | $\begin{array}{r} 87.56 \\ 2.98 \\ \hline \end{array}$ |

25. Subtract 2.58 from 4.3; 2.75 from 4.2.

A Review of Fractions

Give the missing numerators in these examples :

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
1. $\frac{1}{6} = \frac{?}{12}$	$\frac{4}{5} = \frac{?}{20}$	$\frac{5}{8} = \frac{?}{72}$	$\frac{5}{6} = \frac{?}{18}$	$\frac{3}{10} = \frac{?}{20}$
2. $\frac{1}{8} = \frac{?}{24}$	$\frac{3}{4} = \frac{?}{16}$	$\frac{1}{2} = \frac{?}{12}$	$\frac{2}{7} = \frac{?}{14}$	$\frac{2}{3} = \frac{?}{6}$
3. $\frac{7}{8} = \frac{?}{32}$	$\frac{2}{3} = \frac{?}{12}$	$\frac{3}{5} = \frac{?}{25}$	$\frac{1}{9} = \frac{?}{18}$	$\frac{3}{4} = \frac{?}{28}$

Add and check by going over your work :

4. $\frac{3}{8}$ $\frac{3}{4}$ <u>$\frac{1}{2}$</u>	5. $\frac{1}{8}$ $\frac{7}{8}$ <u>$\frac{1}{4}$</u>	6. $3\frac{2}{5}$ $1\frac{1}{10}$ <u>$2\frac{1}{2}$</u>	7. $2\frac{7}{9}$ $3\frac{1}{3}$ <u>4</u>	8. $6\frac{1}{2}$ $7\frac{3}{5}$ <u>$3\frac{2}{5}$</u>
--	--	--	---	---

Subtract and check by going over your work :

9. $2\frac{3}{5}$ $1\frac{1}{10}$ <u> </u>	10. $2\frac{1}{4}$ $1\frac{3}{4}$ <u> </u>	11. $2\frac{5}{8}$ $\frac{7}{8}$ <u> </u>	12. $9\frac{3}{4}$ $3\frac{2}{3}$ <u> </u>	13. $10\frac{3}{8}$ $1\frac{3}{4}$ <u> </u>
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14. Reduce these fractions to lowest terms :

$\frac{3}{18}$	$\frac{3}{15}$	$\frac{10}{12}$	$\frac{16}{24}$	$\frac{5}{20}$	$\frac{4}{16}$	$\frac{6}{12}$	$\frac{6}{20}$	$\frac{75}{100}$	$\frac{40}{100}$
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15. Change to mixed numbers :

$\frac{17}{8}$	$\frac{27}{4}$	$\frac{29}{7}$	$\frac{33}{5}$	$\frac{36}{8}$
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Multiply :

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
16. $\frac{2}{3} \times \frac{4}{5}$	$\frac{5}{8} \times 48$	$1\frac{1}{2} \times \frac{3}{5}$	$2 \times 2\frac{1}{2}$
17. $28 \times \frac{4}{7}$	$2\frac{3}{4} \times \frac{3}{4}$	$3\frac{1}{3} \times \frac{2}{3}$	$3 \times 3\frac{1}{3}$
18. $\frac{7}{8} \times 5\frac{1}{2}$	$2\frac{5}{8} \times 3\frac{1}{2}$	$3\frac{1}{3} \times 1\frac{1}{2}$	$5 \times 2\frac{1}{4}$

Divide :

19. $\frac{3}{4} \div 3$	$\frac{8}{9} \div \frac{1}{6}$	$9 \div \frac{3}{8}$	$4 \div \frac{1}{4}$
20. $42 \div \frac{4}{3}$	$\frac{7}{10} \div 7$	$5 \div \frac{2}{3}$	$2 \div \frac{1}{2}$
21. $2\frac{2}{5} \div \frac{3}{4}$	$2\frac{1}{8} \div \frac{5}{3}$	$2\frac{1}{2} \div 5$	$6 \div \frac{2}{3}$

Fractional Parts of a Dollar

1. $\$.05 = \frac{5}{100} = \frac{?}{20}$ of a dollar. 3. $\$.25 = \frac{25}{100} = \frac{?}{4}$ of a dollar.
 2. $\$.10 = \frac{10}{100} = \frac{?}{10}$ of a dollar. 4. $\$.50 = \frac{50}{100} = \frac{?}{2}$ of a dollar.

5. One day Anna's mother sent her to the store for 12 yards of toweling at 25¢ a yard. When the clerk figured how much to charge Anna, he said, " $12 \times \$\frac{1}{4} = \3 ." Anna thought, "I know my bill is \$3.00, because $12 \times \$.25$ is \$3.00; but why did the clerk say $12 \times \frac{1}{4}$?"

Do you understand his work? On the way home Anna suddenly understood what he had done. She thought, ".25 is the same as $\frac{1}{4}$ dollar. [See Ex. 3 above.] So $12 \times \$\frac{1}{4}$ would give the same answer as $12 \times \$.25$."

6. Find the cost of 48 books at 25¢ each. Work the example

first this way:

\$.25
$\times 48$

; then this way:

$48 \times \$\frac{1}{4}$

. Which is

the shorter and easier way?

7. Do each of these examples two ways and tell which way you think is shorter and easier.

At 25¢ each what is the cost of the following?

(a) 24 drinking glasses

(c) 96 puzzles

(b) 36 dolls

(d) 72 toys

8. At 50¢ each what is the cost of the articles in Ex. 7? Work in two ways. ($.50 = \frac{?}{?}$ of a dollar.)

9. Can you find a short way for learning the cost of 56 games at 75¢ each?

Do not use a pencil to find these answers:

10. Find the cost of 2 dozen books at 25¢ each.

11. Find the cost of 3 dozen pads at 10¢ each.

12. Find the cost of 4 dozen knives at 50¢ each.

13. Find the cost of 40 pairs of stockings at 75¢ a pair.

Fractional Parts of a Dollar

Here is a table showing the number of cents in the common fractional parts of a dollar :

$\$ \frac{1}{10} = 10\text{¢}$	$\$ \frac{1}{5} = 20\text{¢}$	$\$ \frac{1}{8} = 12\frac{1}{2}\text{¢}$	$\$ \frac{1}{6} = 16\frac{2}{3}\text{¢}$
$\$ \frac{3}{10} = 30\text{¢}$	$\$ \frac{2}{5} = 40\text{¢}$	$\$ \frac{3}{8} = 37\frac{1}{2}\text{¢}$	$\$ \frac{1}{3} = 33\frac{1}{3}\text{¢}$
$\$ \frac{5}{10} = 50\text{¢}$	$\$ \frac{3}{5} = 60\text{¢}$	$\$ \frac{5}{8} = 62\frac{1}{2}\text{¢}$	$\$ \frac{1}{2} = 50\text{¢}$
$\$ \frac{7}{10} = 70\text{¢}$	$\$ \frac{4}{5} = 80\text{¢}$	$\$ \frac{7}{8} = 87\frac{1}{2}\text{¢}$	$\$ \frac{2}{3} = 66\frac{2}{3}\text{¢}$
$\$ \frac{9}{10} = 90\text{¢}$	$\$ \frac{1}{4} = 25\text{¢}$	$\$ \frac{3}{4} = 75\text{¢}$	$\$ \frac{5}{6} = 83\frac{1}{3}\text{¢}$

1. Show how the fractional parts of \$1 in the third and fourth columns of the table were obtained. Begin this way :

$$\$ \frac{1}{8} = \frac{1}{8} \text{ of } \$1.00 = \frac{1}{8} \times \frac{\$1.00}{1} = \$12\frac{1}{2}$$

$$\$ \frac{3}{8} = \frac{3}{8} \text{ of } \$1.00 = \frac{3}{8} \times \frac{\$1.00}{1} = \$37\frac{1}{2}$$

2. What part of a dollar is each of the following?

10¢	40¢	12½¢	66⅔¢	75¢	87½¢	20¢
60¢	62½¢	33⅓¢	50¢	37½¢	16⅔¢	83⅓¢

3. Now study the table until you can say both rows in Exercise 2 forward and backward without help.

4. Find the cost of these articles by the short method you learned on the preceding page. Do not use a pencil.

- | | |
|--------------------------|-------------------------------------|
| a. 6 hinges @ 33⅓¢ | f. 16 pairs of socks @ 37½¢ |
| b. 8 pictures @ 87½¢ | g. 24 handkerchiefs @ 62½¢ |
| c. 36 books @ 75¢ | h. 18 potted plants @ 66⅔¢ |
| d. 48 towels @ 25¢ | i. 96 boxes of talcum powder @ 37½¢ |
| e. 96 wash cloths @ 12½¢ | j. 64 cans of syrup @ 87½¢ |

A Number Page

1. The following table tells how much it costs to keep the schools open for one year in some of the states. Can you read the amounts?

Alabama . . .	\$ 12,827,945	Pennsylvania . .	\$109,468,075
California . . .	93,534,315	South Dakota . .	15,552,102
Illinois . . .	103,201,265	Tennessee . . .	15,155,845
Massachusetts . .	57,332,711	Texas	52,452,075
New York . . .	183,421,841	Virginia	21,216,606
North Carolina .	22,079,183	Washington . . .	29,633,324
Ohio	116,568,994	Wisconsin . . .	40,146,691
Oklahoma . . .	30,479,357	Wyoming . . .	5,067,272

2. Which of the states in the table spent the largest amount on its public schools? Which spent the least amount?

3. How much more did Pennsylvania spend than California? Texas than Tennessee? Oklahoma than Washington?

4. In one year there were 5,617,149 boys enrolled in the public schools of the United States, and 5,617,017 girls. Were there more boys or more girls enrolled? How many more?

5. St. Paul, Minnesota, pays on the average \$88.87 a year to educate each child in the city schools. How much does it cost the city a year to educate the five children in the Bird family?

X = 10	L = 50	C = 100	D = 500	M = 1000
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6. In the chart below find an Arabic number to match each Roman number:

ROMAN NUMBERS			ARABIC NUMBERS		
XIV	LVI	CXVII	710	1660	400
DCCX	CD	CMV	905	14	1090
MD	MXC	MDCLX	56	1500	117

Problem Study

Do the problems on this page. If you get Problem 1 wrong, go to the next page and do Problem 1. Then come back and see if you can do Problem 1 on this page correctly. If you fail Problem 2 on this page, try Problem 2 on the next page. Then try Problem 2 on this page again, and so on.

1. Mrs. Miller is going to buy an electric washing machine. If she pays cash, she can get it for \$82.50. If she does not pay cash, she must pay \$10.00 "down" (that is, when she gets the machine) and continue to pay \$7.00 a month for a year. How much will she save by paying cash for it?

2. The carfare from Parkville to New York is 69¢. A 10-trip ticket costs \$5.40. How much can you save on each trip by buying a 10-trip ticket?

3. Mr. Gray received \$209.25 in his pay envelope last month. He had worked 27 days during the month. Is his daily pay as high as that of Mr. Jones, who earns \$8.00 a day?

4. Teddy saved \$4.50 to spend on his vacation. If he spends 25¢ a day, how long will his money last?

5. (a) Alfred works in a grocery store. Yesterday a lady came in and asked for 20 cents' worth of chocolate creams. The chocolate creams sell for 60¢ a pound. Alfred gave her $\frac{1}{4}$ of a pound. Was that right?

(b) When a customer asked Alfred for 15¢ worth of chocolates that sold at 60¢ a lb., Alfred gave her 4 oz. Was that what he should have given her?

6. James works for a butcher after school and receives 30¢ an hour. On Monday he worked 2 hr. 15 min. The butcher paid him 68¢. Was that the correct amount? On Tuesday he worked 3 hr. 20 min. How much should he have received that day? On Wednesday he worked 2 hr. 40 min. How much did he earn on Wednesday? on all three days?

Problem Study Helps

Pupils who do all the problems on page 172 correctly the first time they try them, need not do the problems on this page.

1. (a) Harry's father gave him 10¢ on Sunday and 5¢ every other day in the week. How much did he give him all together?

(b) Bert's mother gave him 50¢ during the week. Who received more, Harry or Bert?

2. (a) A strip of 10 trolley tickets costs 40¢. How much does one ride cost?

(b) If trolley fare is 5¢ a ride, how much do you save on each ride by buying a strip of 10 tickets?

3. (a) Earl works 6 days a week. He receives \$6.00 a week. How much does he receive a day?

(b) Does Earl earn as much in a day as Jack, whose daily pay is \$1.15?

4. (a) Ted has a quarter. If he spends 5¢ a day, how long will his money last?

(b) Rita has 35¢. If she spends 5¢ a day, how long will her money last?

5. If crackers sell at 20¢ a pound, (a) for 1¢ you can get $\frac{1}{20}$ of a pound;

(b) for 5¢ you can get $\frac{5}{20}$ or $\frac{1}{4}$ of a pound.

(c) If cookies sell at 40¢ a pound, for 20¢ you can get $\frac{20}{40}$ or $\frac{1}{2}$ of a pound.

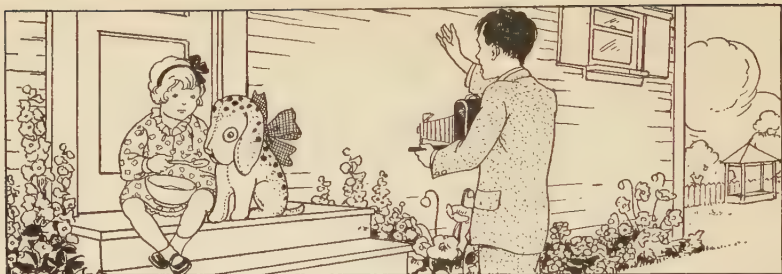
(d) If candy sells for 30 cents a pound, what part of a pound can you get for 1¢? for 10¢?

6. (a) 10 min. is $\frac{10}{60}$ or $\frac{1}{6}$ of an hour. What part of an hour is 20 min.? 30 min.? 40 min.? 50 min.?

(b) 1 hr. 10 min. is $1\frac{1}{6}$ hr.; 2 hr. 20 min. is $2\frac{1}{3}$ hr.

(c) At 60¢ an hour how much can you earn in $1\frac{1}{6}$ hr.? in 1 hr. 10 min.? in $2\frac{1}{3}$ hr.? in 2 hr. 20 min.?

The Kodak Sale *



Donald's father gave him \$10.00 for his birthday. He decided to buy a kodak. He saw this notice of a kodak sale.

One Third Off These Prices

No. 1 Kodak takes pictures $2\frac{1}{4} \times 3\frac{1}{4}$. . . \$12.00

No. 2 Kodak Junior takes pictures $2\frac{1}{4} \times 4\frac{1}{8}$. \$13.00

No. 3 Folding Kodak takes pictures $2\frac{1}{4} \times 4\frac{1}{4}$ \$10.00

No. 4 Pocket Kodak takes pictures $1\frac{5}{8} \times 2\frac{1}{2}$ \$6.00

1. Donald first figured out how much each kind of kodak would cost at the sale. How much do you find they would cost?

2. Then he drew a rectangle to show the size of the pictures taken by each camera, to see which size he liked best. You draw the rectangles and see which size you like best.

3. He liked the largest size best, which is Kodak No. ____.

4. He bought Kodak No. 3 and 2 films, on each of which he could take 6 pictures. The films cost 40¢ each. He also bought a 75-cent picture album and a 10-cent tube of paste. He figured that he should get ____ change from his 10-dollar bill.

5. After he had taken the 12 pictures, he took the 2 films to the photographer who charged 10¢ to develop each film and 4¢ to print each picture. Only 8 of his pictures were good enough to be printed. How much did he have to pay the photographer?

6. He figured that the 8 pictures cost him $16\frac{1}{2}$ ¢ each, counting the cost of the films, developing, and printing. Do you agree?

The Cost of Driving an Automobile *

1. Mr. Blair's car cost him \$1,150.00 when it was new. His expense account shows that he has spent \$375.29 for upkeep (that is, repairs, tires, insurance, etc.) in the three years he has had it. The car and repairs together have cost him ____.

2. He pays \$5.00 a month for garage rent. In the 3 years he has owned the car he has spent ____ for garage rent.

3. One day, as he bought gasoline, he saw his speedometer registered 2,327 miles. After he had used up 30 gallons, the speedometer registered 2,808 miles. He figured he was getting about ____ miles to the gallon.

4. The speedometer now shows that the car has traveled 22,528 miles. Allowing 16 miles to the gallon, he has used ____ gallons of gasoline in going the 22,528 miles.

5. At an average cost of 23¢ a gallon, he has spent ____ for the 1408 gal. of gasoline he has used since he bought the car.

6. The car used a quart of oil about every 250 miles; so in going 22,528 miles it has used up about ____ qt. of oil.

7. At 30¢ a quart, the 90 qt. of oil for the car have cost ____.

8. Mr. Blair figures that since he has spent \$1525.29 for the car and repairs, \$180 for garage rent, \$323.84 for gasoline, and \$27 for oil, he has spent ____ all together on the car.

9. He is going to sell the car for \$475.00. In Exercise 8 we see that he has spent \$2056.13. Now he is getting \$475.00 back; so it has really cost him only ____ to own and run the car for three years.

10. If it has cost him \$1581.13 to travel 22,528 miles, it has cost him a little more than ____¢ a mile to run his car.

11. His office is 4 miles from home. To travel the 8 miles at 7¢ a mile costs him ____ cents a day. The trolley fare is 20¢. How much more does the trip cost by automobile than by trolley?

Measurement

Tell what numbers belong in these blank spaces:

1. 9:45 means . . .
2. 1 ft. = ____ in.
3. $\frac{1}{2}$ yd. = ____ in.
4. 1 qt. = ____ pt.
5. 1 min. = ____ sec.
6. 1 pk. = ____ qt.
7. 1 hr. = ____ min.
8. $\frac{1}{2}$ lb. = ____ oz.
9. $\frac{1}{8}$ pk. = ____ qt.
10. $\frac{1}{2}$ hr. = ____ min.
11. 2 gal. = ____ qt.
12. 5 dozen = ____ things.
13. $\frac{1}{4}$ yd. = ____ in.
14. $\frac{1}{4}$ bu. = ____ pk.
15. 1 gross = ____ things.
16. 1 rod = ____ ft.
17. $\frac{3}{4}$ hr. = ____ min.
18. $\frac{1}{2}$ gal. = ____ qt.
19. 1 mile = ____ ft.
20. 1 mile = ____ rd.
21. 1 sq. ft. = ____ sq. in.
22. P.M. means . . .
23. $\frac{1}{2}$ ton = ____ lb.
24. 1 yr. = ____ mo.
25. 2 acres = ____ sq. rd.
26. 1 yr. = ____ wk.
27. $\frac{1}{2}$ sq. mi. = ____ acres.
28. $\frac{1}{4}$ doz. = ____ things.
29. 1 yd. = ____ in.
30. 1 gal. = ____ qt.
31. 9 dimes and 4 nickels = ____ ¢
32. 1 lb. = ____ oz.
33. 1 bu. = ____ pk.
34. 27 sq. ft. = ____ sq. yd.
35. A.M. means . . .
36. $\frac{1}{2}$ doz. = ____ articles.
37. $\frac{3}{4}$ lb. = ____ oz.
38. 1 acre = ____ sq. rd.
39. 8 oz. = ____ ____ lb.
40. 1 yd. = ____ ft.
41. $\frac{3}{4}$ ton = ____ lb.
42. 1 ton = ____ lb.
43. 36 sq. ft. = ____ sq. yd.
44. 3 quarters and 2 dimes = ____ ¢
45. $\frac{1}{4}$ min. = ____ sec.
46. 1 sq. mi. = ____ acres.
47. 12 oz. = ____ lb.
48. $\frac{1}{8}$ sq. mi. = ____ acres.
49. 1 leap yr. = ____ da.
50. 1 sq. yd. = ____ sq. ft.
51. 2 sq. mi. = ____ acres.
52. $\frac{1}{2}$ acre = ____ sq. rd.
53. $\frac{1}{4}$ sq. mi. = ____ acres.
54. 4 acres = ____ sq. rd.

Using Fractions

1. Find the cost of a $12\frac{5}{8}$ -pound turkey at 35¢ a pound.
2. Marie has a muffin recipe that makes enough for six persons. It calls for $\frac{3}{4}$ cup of milk and $1\frac{1}{2}$ cups of flour. If she makes enough muffins for three persons, how much milk and flour should she use?
3. James caught a fish that weighed $5\frac{3}{4}$ lb. Ned caught one that weighed $3\frac{7}{8}$ lb. James said, "My fish is ____ lb. heavier than yours."
4. Billy built a shelf in his mother's pantry $1\frac{1}{4}'$ long. His mother asked him to build another for the kitchen, but to make it $2\frac{1}{2}$ times as long as the one in the pantry. How long shall he make the kitchen shelf?
5. Marie went to the store for a dozen rolls that cost 20¢ a dozen. The baker had only 7 rolls left; so he said, "You may have these 7 for 10¢ ." Was that more or less than the regular price?
6. How many square feet are there in an area $4\frac{1}{4}' \times 6\frac{1}{2}'$?
7. Mrs. Buck bought a remnant of dress goods containing $9\frac{1}{8}$ yd. for 75¢ a yard. How much did the piece cost her?
8. Her sister asked her if she would sell her $4\frac{1}{2}$ yd. of that piece. If she does, (a) how many yards will she have left? (b) How much should she charge for it?
9. How many dress patterns $3\frac{1}{2}$ yd. long can a merchant cut from a 10-yard piece of material? How many yards of material would be left over?
10. Find the cost of one of the $3\frac{1}{2}$ -yard dress patterns, if the material is worth \$1.59 a yard.
11. Find the value of the piece of material left over (Ex. 9).

Work with Fractions

Add:

1. $\frac{1}{2}$	2. $\frac{1}{4}$	3. $\frac{3}{4}$	4. $1\frac{3}{4}$	5. $5\frac{1}{6}$	6. $8\frac{7}{8}$	7. $3\frac{5}{8}$
$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{6}$	$2\frac{3}{8}$	$8\frac{2}{3}$	$3\frac{1}{2}$	$2\frac{1}{2}$
<u>$\frac{1}{8}$</u>	<u>$\frac{1}{3}$</u>	<u>$\frac{1}{2}$</u>	<u>$5\frac{1}{2}$</u>	<u>$2\frac{1}{2}$</u>	<u>$2\frac{1}{4}$</u>	<u>4</u>

Subtract:

8. $\frac{3}{4}$	9. $\frac{5}{6}$	10. $2\frac{5}{6}$	11. $4\frac{1}{4}$	12. 5	13. $6\frac{1}{4}$	14. $3\frac{1}{8}$
$\frac{1}{2}$	$\frac{1}{4}$	$1\frac{1}{3}$	$2\frac{1}{2}$	$3\frac{1}{5}$	$2\frac{2}{3}$	$2\frac{1}{3}$
<u>$\frac{1}{2}$</u>	<u>$\frac{1}{4}$</u>	<u>$1\frac{1}{3}$</u>	<u>$2\frac{1}{2}$</u>	<u>$3\frac{1}{5}$</u>	<u>$2\frac{2}{3}$</u>	<u>$2\frac{1}{3}$</u>

Multiply:

15. $\frac{2}{3} \times \frac{3}{4}$	17. $2\frac{3}{5} \times \frac{5}{6}$	19. $\frac{5}{6} \times \frac{1}{4}$	21. $4\frac{1}{5} \times 1\frac{1}{7}$
16. \$3.25	18. 32	20. 560	22. 742
<u>$5\frac{1}{5}$</u>	<u>$4\frac{2}{3}$</u>	<u>$14\frac{5}{8}$</u>	<u>$12\frac{3}{4}$</u>

Divide:

23. $\frac{2}{3} \div \frac{5}{6}$	24. $\frac{7}{8} \div 5$	25. $5 \div \frac{1}{9}$	26. $2\frac{1}{5} \div 3\frac{2}{3}$
------------------------------------	--------------------------	--------------------------	--------------------------------------

Reduce to simplest form:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>
27. $\frac{24}{32}$	$\frac{21}{28}$	$\frac{14}{6}$	$\frac{25}{4}$	$\frac{48}{12}$	$3\frac{3}{9}$	$\frac{33}{6}$	$5\frac{2}{6}$	$\frac{30}{4}$	$\frac{51}{7}$
28. $\frac{35}{8}$	$\frac{25}{6}$	$\frac{14}{16}$	$\frac{27}{5}$	$\frac{17}{6}$	$\frac{15}{6}$	$\frac{39}{9}$	$\frac{25}{10}$	$\frac{32}{7}$	$\frac{45}{6}$
29. $\frac{27}{9}$	$\frac{29}{7}$	$\frac{18}{27}$	$\frac{27}{36}$	$\frac{44}{6}$	$\frac{27}{6}$	$\frac{44}{8}$	$\frac{68}{8}$	$\frac{59}{7}$	$\frac{57}{9}$

Give the missing numbers:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
30. $\frac{5}{6} = \frac{?}{12}$	$\frac{2}{3} = \frac{?}{18}$	$\frac{4}{9} = \frac{?}{18}$	$\frac{3}{4} = \frac{?}{20}$	$\frac{3}{8} = \frac{?}{24}$
31. $\frac{3}{4} = \frac{?}{12}$	$\frac{5}{8} = \frac{?}{16}$	$\frac{5}{7} = \frac{?}{14}$	$\frac{2}{3} = \frac{?}{15}$	$\frac{7}{8} = \frac{?}{16}$

32. Fractions must have a common denominator before they can be ____ or ____.

33. To ____ or ____ both the numerator and the denominator of a fraction by the same number does not ____ the value of the fraction.

Four Fraction Tests

TEST I

- | | | | |
|---------------------------------|-------------------------------------|----------------------------------|----------------------------------|
| 1. $\frac{5}{6} = \frac{?}{12}$ | 3. $\frac{5}{8} \div \frac{3}{4}$ | 5. $\frac{5}{8} + \frac{3}{4}$ | 7. $4\frac{2}{3} - 2\frac{1}{3}$ |
| 2. $\frac{27}{6} = ?$ | 4. $\frac{2}{3} \times \frac{5}{6}$ | 6. $2\frac{3}{8} + 3\frac{2}{3}$ | 8. $5\frac{1}{6} - 4\frac{1}{4}$ |
9. Find the area of a surface which is $2\frac{1}{2}' \times 3\frac{1}{2}'$.

10. If you take $5\frac{3}{4}$ lb. of sugar out of a bag containing 25 lb. of sugar, how many pounds will be left in the bag?

TEST II

- | | | |
|--|--|--|
| 1. $\begin{array}{r} \frac{2}{3} \\ + \frac{3}{8} \\ \hline \end{array}$ | 4. $\begin{array}{r} 3\frac{5}{6} \\ + 4\frac{2}{5} \\ \hline \end{array}$ | 7. $\begin{array}{r} \frac{5}{8} \\ - \frac{1}{3} \\ \hline \end{array}$ |
| 2. $\begin{array}{r} 5 \\ - 2\frac{5}{8} \\ \hline \end{array}$ | 5. $\frac{2}{3} \times \frac{6}{7} =$ | 8. $3\frac{1}{5} \times 4\frac{1}{3} =$ |
| 3. $\begin{array}{r} 250 \\ \times 14\frac{3}{5} \\ \hline \end{array}$ | 6. $\frac{7}{8} \div \frac{3}{4} =$ | 9. $4\frac{1}{5} \div 1\frac{2}{3} =$ |

TEST III

- | | | | |
|---------------------------------------|-----------------------------|--|--|
| 1. $\frac{7}{8} \times \frac{5}{6} =$ | 4. $6 \times \frac{2}{7} =$ | 7. $\frac{5}{6} \times 3\frac{3}{4} =$ | 10. $2\frac{1}{5} \times 5\frac{1}{3} =$ |
| 2. $5 - 1\frac{3}{8} =$ | 5. $4 + 2\frac{5}{6} =$ | 8. $\frac{3}{9} \div 3 =$ | 11. $\frac{5}{6} \div \frac{3}{4} =$ |
| 3. $\frac{3}{5} = \frac{?}{15}$ | 6. $\frac{15}{8} =$ | 9. $\frac{27}{30} = \frac{?}{?}$ | 12. $\frac{24}{32} = \frac{?}{?}$ |

13. Helen made a dress for her baby sister. She bought $1\frac{3}{4}$ yd. of lawn at 40¢ a yard, and $2\frac{7}{8}$ yd. of lace at 10¢ a yard. How much money did she need for the materials?

TEST IV

- | | |
|--|---------------------------------------|
| 1. Can $\frac{24}{6}$ be reduced to a mixed number, a proper fraction, or a whole number? | |
| 2. Does $\frac{1}{2} - \frac{1}{3}$ equal $\frac{2}{5}$, $\frac{5}{6}$, or $\frac{1}{6}$? | 6. $\frac{1}{2} + \frac{1}{3} =$ |
| 3. Does $\frac{27}{6}$ equal $4\frac{1}{2}$? | 7. $\frac{1}{2} - \frac{1}{5} =$ |
| 4. Does $\frac{3}{5} \times 3$ equal $1\frac{4}{5}$? | 8. $\frac{1}{2} \times \frac{1}{3} =$ |
| 5. Does $\frac{7}{8} \times \frac{4}{7}$ equal $\frac{1}{2}$? | 9. $\frac{1}{2} \div \frac{1}{3} =$ |

A Page of Division *

Divide and check:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $94 \overline{)16875}$	$74 \overline{)13286}$	$46 \overline{)92165}$	$73 \overline{)12584}$
2. $57 \overline{)1995}$	$87 \overline{)13574}$	$73 \overline{)146463}$	$406 \overline{)10150}$
3. $67 \overline{)54983}$	$95 \overline{)68743}$	$79 \overline{)158639}$	$2700 \overline{)102600}$
4. $98 \overline{)7962}$	$24 \overline{)29863}$	$45 \overline{)10800}$	$5600 \overline{)95200}$
5. $94 \overline{)17865}$	$95 \overline{)190098}$	$79 \overline{)86543}$	$185 \overline{)67849}$
6. $\frac{3}{4} = ? \div ?$	8. $2\frac{3}{5} \div 1\frac{1}{5} = ?$		
7. $\frac{6}{4} = ? \div ?$	9. $3\frac{5}{8} \div \frac{1}{8} = ?$		

10. In Exercise 1, 94 is the ____ and 16875 is the ____.

11. To check a division example, we multiply the ____ by the ____ and add the _____. The sum should equal the ____.

12. If you can travel 24 miles an hour, how long will it take you to go 100 miles?

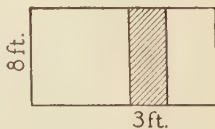
13. How many towels $\frac{3}{4}$ yd. long can you cut from 12 yd. of toweling?

14. At 49¢ each, how many large balls will \$5.00 buy?

15. If a set of 25 books costs \$36.50, you are paying an average of ____ a book.

16. Billy has a board 12 ft. long. He wants to cut from it as many $3\frac{1}{2}$ -foot lengths as possible. How many such lengths can he get, and how long a piece will be left?

17. *A Problem for Bright Pupils.* The shaded part of this drawing shows the strip of porch floor in Tom's house that needs repairing. When Tom went to buy the boards to repair it, he found they were $1\frac{1}{2}$ in. wide and 12 ft. long. How many of those boards did he need?



Using Decimals

1. Don bought a box containing 100 pencils for \$3.50. He sold them at 5¢ each. Do you know how much money he made?

2. Billy heard what Don had done; so he bought a box containing 75 erasers for \$2.00. He sold 29 of them for 5¢ each and the rest for 4¢ each. How much did he make?

3. At 25¢ a square foot, find the cost of laying a cement floor in a cellar 26.5' by 14.5'.

4. Some Scouts started to hike from Myerstown to Radcliff, a distance of 12.4 miles. Teddy had a pedometer, and at noon he told the boys they had gone 7.7 miles. James said, "We still have ____ miles to go."

5. The living room in Jack's home is $12' \times 14.5'$. The living room in Dan's home is $11.5' \times 15.1'$. Jack says that his is larger. Dan says that his is larger. Can you settle the argument?

6. Mr. Smith drove 9,769.8 miles in his old automobile. He has driven 5,004.5 miles in his new one. How far has he driven all together?

7. The Blain family would like to buy a victrola which costs \$78.00. How much should they save toward it each week so as to be able to buy it at the end of a year?

8. Before a heavy rain there was 4.6 ft. of water in a tank. After the rain there was 5 ft. of water in the tank. How much had the water level risen during the rain?

9. Find the area of a piece of cardboard $3.5'' \times 4.5''$.

10. Robert can buy a box containing 6 baseballs for \$3.50. If he buys them at that price and sells them for 78¢ each, how much will he gain on each baseball? on all the baseballs?

11. How much greater a distance is 198 miles than 165.6 miles?

Practice with Decimals

1. Can you do these examples in 10 minutes?

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
$\$5.60 \div 8$	1.26×4	$10 \times .28$	$7 \times .007$
$\$3.60 \div 2$	4.00×7	$100 \times .28$	$3 \times .532$
$14 \times .5$	$\$3.00 \div 5$	$100 \times .36$	$4 \times .132$
$9 \times .7$	$\$4.50 \div 9$	$\frac{1}{2} \times 36$	$4 \overline{) \$8.36}$
$13 \times .3$	$\$1.44 \div 12$	$.5 \times 36$	$2 \overline{) \$6.50}$
$30 \times .24$	$.50 = \frac{?}{2}$	$.62\frac{1}{2} = \frac{?}{8}$	$.87\frac{1}{2} = \frac{?}{8}$
$.9 + .5$	$.33\frac{1}{3} = \frac{?}{3}$	$.70 = \frac{?}{7}$	$.12\frac{1}{2} = \frac{?}{8}$
$.6 + .7$	$.66\frac{2}{3} = \frac{?}{3}$	$.75 = \frac{?}{4}$	$.90 = \frac{?}{7}$
239×10	$.16\frac{2}{3} = \frac{?}{6}$	$.80 = \frac{?}{7}$	$.20 = \frac{?}{7}$
75×100	$.25 = \frac{?}{4}$	$.37\frac{1}{2} = \frac{?}{8}$	$.60 = \frac{?}{7}$

Which is larger :

- | | |
|---------------------|----------------------|
| 2. 76.76 or 766.7? | 5. 750.05 or 75.005? |
| 3. 300.3 or 300.03? | 6. 3.566 or 3.6? |
| 4. 607.5 or 607.50? | 7. 4.77 or 4.757? |

Copy, add, and check :

8. 56.24 ; 357.08 ; 295.90 ; 456.395.
9. 270.004 ; 300.05 ; 470.705 ; 490.046.
10. 569.743 ; 29.006 ; 438.075 ; 298.997.

Copy, subtract, and check :

- | | |
|------------------------|-----------------------|
| 11. 35.79 from 200.5 | 13. 295.75 from 300 |
| 12. 49.675 from 50.463 | 14. 397.04 from 397.4 |

Multiply, and check by going over your work :

- | | |
|------------------|---------------------|
| 15. 45.7 by 29.3 | 19. 7498 by 3.9 |
| 16. 75.4 by 3.56 | 20. 45.76 by 32.5 |
| 17. 209 by 3.5 | 21. 49.63 by 234 |
| 18. .023 by 3 | 22. $.4 \times .02$ |

Three Tests

TEST I (2 minutes)

Answer Yes or No to these questions:

1. Is 26.04 larger than 26.4?
2. Does $.600 = .60 = .6$?
3. Does $\frac{3}{4} = .70$?
4. Does $.3 \times .13 = .39$?
5. At 25¢ each, will 48 dolls cost \$10?
6. Is $12\frac{1}{2}$ ¢ equal to $\frac{1}{8}$ of a dollar?
7. Is this addition correct? $\xrightarrow{\hspace{10em}}$
8. Is the area of a flower bed $3' \times 2'$ equal to 6 ft.?

127.8
12.56
25.34

TEST II (2 minutes)

Complete these sentences:

1. Three fourths of a dollar is the same as ____ cents.
2. The area of a floor $16' \times 20'$ is ____ sq. ft.
3. There are ____ sq. rd. in an acre.
4. $12\frac{1}{2}$ ¢ is ____ of a dollar.
5. The area of a surface depends on its ____ and its ____.
6. $2\frac{1}{2}$ yd. of gingham at 24¢ a yard will cost ____¢.
7. If two girls share $\frac{3}{4}$ of a yard of ribbon equally, each girl will get three ____ of a yard.
8. $1\frac{1}{4}$ lb. is one ____ pound more than $\frac{3}{4}$ of a lb.

TEST III (2 minutes)

1. If a box containing 16 Christmas cards costs \$1.00, how much does each card cost?
2. How many ribbon head bands 18 in. long can be made from 10 yards of ribbon?
3. At $37\frac{1}{2}$ ¢ a pound, find the cost of a $3\frac{1}{2}$ -pound chicken.
4. Our speedometer read 101.7 miles when we started to York and 165.1 miles when we got back. We drove ____ mi.

Problem Study

1. How much change will you get from a 2-dollar bill if you buy $2\frac{1}{4}$ lb. of butter at 60¢ a pound and a dozen and a half of eggs at 35¢ a dozen? (See Ex. 1, page 89.)

2. Ted has 8 bu. 3 pk. of potatoes to sell. If he gets 90¢ a bushel for them, how many pigeons at 40¢ each can he buy with the money? (See Ex. 2, page 89.)

3. Mr. Adams bought a table for \$12.75. He paid \$1.25 to have it hauled to his shop. Then he spent \$1.69 for paint to refinish the table. He finally sold it for \$20.00. How much did he gain on it? (See Ex. 3, page 89.)

4. If a horse is fed $\frac{3}{8}$ bu. of oats a day, how long will 9 bu. of oats last? (See Ex. 4, page 89.)

5. My father's average rate of driving is $24\frac{1}{2}$ mi. an hour. How long should he allow for driving a distance of $73\frac{1}{2}$ mi.? (See Ex. 5, page 89.)

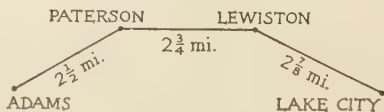
6. A steamship which covers $131\frac{1}{4}$ mi. in 5 hr. 15 min. travels at a rate of ____ mi. an hour. (See Ex. 6, page 89.)

7. At \$60 an acre, what is the cost of a field 10.0 rd. wide and 16.0 rd. long? (See Ex. 7, page 89.)

8. Mr. Altman had a table that he wanted to get rid of. He told Jack that if he sold it, he would allow him to keep $\frac{1}{8}$ of the money. Jack sold it for \$8.40. How much should he keep? (See Ex. 8, page 89.)

9. Would a dozen handkerchiefs that are selling at 6 for \$1.00 cost as much as a dozen handkerchiefs that are selling at 17¢ each? (See Ex. 9, page 89.)

10. How far is it by this road from Adams to Lake City? (See Ex. 10, page 89.)



Are You Going into Sixth Grade?

Pupils who can do all the examples on pages 185 and 186 are ready for sixth-grade arithmetic.

1. Find the quotient of (a) $\$75.00 \div 36$; (b) $\$156.00 \div 168$.
2. Find the product of (a) $698 \times \$75.89$; (b) $540 \times \$98.79$.
3. Add: $\$46.95$, $\$398.75$, $\$469.08$, $\$375.29$, and $\$658.79$.
4. Add: 3.96, 4.99, 9.87, 5.55, 6.07, and 8.79.
5. Add: $25\frac{1}{2}$, $39\frac{1}{4}$, $63\frac{3}{4}$, 28, 69, and $80\frac{3}{8}$.
6. Tell which of the following are (a) whole numbers, (b) mixed numbers, (c) proper fractions, (d) improper fractions.

29	$\frac{9}{5}$	28	$16\frac{1}{2}$	$\frac{3}{4}$	$\frac{16}{8}$	$9\frac{2}{5}$	$3\frac{1}{2}$
$66\frac{2}{3}$	$\frac{5}{9}$	$\frac{28}{3}$	$\frac{27}{4}$	$\frac{8}{16}$	$\frac{75}{3}$	$\frac{5}{10}$	$\frac{28}{4}$

a	b	c	d
7. $\frac{1}{2} + \frac{1}{4}$	$\frac{3}{4}$ of 24	$\frac{1}{6}$ of 35	$7 - 1\frac{3}{4}$
8. 10×25	$\frac{7}{8} + \frac{1}{4}$	$66\frac{2}{3} \times 33\frac{1}{3}$	$\frac{7}{8} \times \frac{1}{7} \times \frac{4}{5}$
9. $8 \div \frac{1}{4}$	100×6.37	9×50	$5 \times \frac{1}{5} \times \frac{3}{2}$
10. $\frac{1}{8}$ of 64	$6 \div \frac{1}{5}$	97.3×10	$8 \div \frac{1}{7}$
11. $5 \times 12\frac{1}{2}$	$3 \times 16\frac{2}{3}$	97.3×100	$.2 \times .42$

Tell whether these statements are true or false:

- | | | |
|--------------------------------|----------------------------------|---|
| 12. $\frac{3}{4} = .75$ | 20. $\$208 = \20.80 | 28. $6 \div \frac{5}{6} = 6 \times \frac{6}{5}$ |
| 13. $9.5 = 9\frac{1}{2}$ | 21. $1\frac{1}{4} = \frac{5}{4}$ | 29. $.07 + .08 = .0015$ |
| 14. $96 = 960$ | 22. $\frac{7}{8} = \frac{8}{7}$ | 30. $10 \times 46 = 4.6$ |
| 15. $9.6 = 9.60$ | 23. $\$.33\frac{1}{3} = \$.3$ | 31. $\frac{9}{27} = \frac{1}{3}$ |
| 16. $.350 = .35$ | 24. $.46 = .046$ | 32. $\frac{64}{7} = 9\frac{1}{7}$ |
| 17. $\$.12\frac{1}{2} = \$.18$ | 25. $\$.10 = \$.10$ | 33. $3\frac{1}{2} \div 1\frac{1}{2} = \frac{7}{2} \times \frac{3}{2}$ |
| 18. $.600 = .6$ | 26. $\$.16\frac{1}{3} = \$.16$ | 34. $12 \div 2 = 12 \times \frac{1}{2}$ |
| 19. $.8 = \frac{8}{10}$ | 27. $1\frac{1}{6} = \frac{6}{7}$ | 35. $7.500 = 7\frac{1}{2}$ |

36. $.32 \times 3.5$ gives the same answer as $\frac{32}{100} \times 3\frac{1}{2}$.

Are You Going into Sixth Grade?

1. Find the product of 1.8×4.25 ; $1\frac{4}{5} \times 4\frac{1}{4}$.

2. Find the product of 2.75×3.6 ; $2\frac{3}{4} \times 3\frac{3}{4}$.

Without multiplying, choose the correct answers:

3. $3.67 \times 52.3 =$

(a) 191.941 (b) 1919.41 (c) 19.1941 (d) 19194.1

4. $.25 \times \$3.24 =$ (a) \$.081 (b) \$81 (c) \$8.10 (d) \$.81

5. $.75 \times \$4.48 =$ (a) \$3.60 (b) \$.36 (c) \$360 (d) \$.036

6. $1\frac{7}{8} + 2\frac{3}{4} + 6\frac{1}{2}$

8. $5\frac{5}{12} - 2\frac{3}{4}$

7. $2\frac{5}{6} + 1\frac{1}{4} + 3\frac{1}{2}$

9. $6\frac{3}{16} - 1\frac{7}{8}$

10. We have $4\frac{1}{2}$ yards of ribbon. First we thought of cutting it into honor badges $\frac{1}{8}$ yd. long and found it would make ____ badges.

11. But we decided we needed only 27 badges so we could make each one ____ yd. or ____ in. long.

How many square feet are there in rectangles that have the following dimensions in feet?

12. $3\frac{1}{2} \times 2\frac{3}{4}$

15. $3\frac{1}{2} \times 4\frac{1}{2}$

13. 6.8×3.4

16. 6.2×3.3

14. 3.4×2.2

17. $5\frac{3}{5} \times 2\frac{1}{2}$

Find the cost of:

18. $\frac{3}{4}$ lb. tea @ 72¢.

23. $2\frac{1}{8}$ lb. crackers @ 15¢.

19. $2\frac{1}{2}$ lb. lard @ 23¢.

24. 3 lb. 4 oz. candy @ 40¢.

20. $2\frac{1}{4}$ lb. butter @ 41¢.

25. 2 lb. 8 oz. bacon @ 22¢.

21. $3\frac{3}{4}$ lb. cheese @ 33¢.

26. 3 lb. 6 oz. cookies @ 32¢.

22. $1\frac{1}{2}$ lb. wafers @ 19¢.

27. 1 lb. 8 oz. meat @ 60¢.

Progress Test No. 7

Write only the answers to these examples on your paper. Number each answer. (Record your score.)

1. Write in figures: six million, four hundred six.
2. Write in figures: four and four thousandths.
3. Write in figures: XC; XL; LXXIV.

Add:

$$\begin{array}{r} 4. \quad 579 \\ 860 \\ 793 \\ 456 \\ 963 \\ \hline 497 \end{array}$$

$$\begin{array}{r} 5. \quad \frac{3}{4} \\ \frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 2\frac{1}{4} \\ 2\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad 4.56 \\ 8.27 \\ \hline 9.54 \end{array}$$

$$\begin{array}{r} 6. \quad \frac{7}{8} \\ \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 3\frac{5}{6} \\ 2\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad 5999 \\ 3795 \\ \hline \end{array}$$

Subtract:

$$\begin{array}{r} 11. \quad \frac{7}{8} \\ \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad 2\frac{1}{2} \\ 1\frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 13. \quad 5\frac{5}{8} \\ 3\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 14. \quad 4.72 \\ 2.598 \\ \hline \end{array}$$

Multiply:

15. $\frac{2}{3}$ by $\frac{6}{7}$. 16. $1\frac{1}{5}$ by $6\frac{1}{4}$. 17. 3.75 by 2.5. 18. .32 by .2.

Divide:

19. $\frac{5}{8}$ by $\frac{3}{4}$. 20. $2\frac{5}{6}$ by $1\frac{2}{3}$. 21. \$3.75 by \$1.25.

22. At 25¢ a dozen what is the cost of 48 dozen cakes? (Use a short method.)

23. What part of a dollar is $33\frac{1}{3}$ ¢?

24. If you multiply 22.56 by 8.1, would your answer be about 17, 170, or 1700?

25. There are ____ sq. in. in a square foot and ____ sq. ft. in a square yard.

Standards: X, 22. Y, 19. Z, 14.

Finding Out What You Know and What You Don't Know

TEST I. ADDITION

- | | | | | | |
|------|-------------|-----------------------------|-------------------|------------------|-------------------|
| 1. 2 | 2. \$354.39 | 3. $\frac{1}{1\frac{1}{2}}$ | 4. $2\frac{7}{8}$ | 5. $\frac{3}{4}$ | 6. $4\frac{3}{8}$ |
| 5 | 59.56 | $\frac{3}{4}$ | $2\frac{1}{2}$ | $\frac{1}{5}$ | $5\frac{1}{3}$ |
| 9 | 4.79 | $\frac{1}{2}$ | | | |
| 8 | 89.94 | | | | |
| 7 | 5.00 | | | | |
| 6 | | | | | |
| 9 | | | | | |
| — | | | | | |
-
- | | |
|-------------------|---------|
| 7. $7\frac{3}{4}$ | 8. 3.46 |
| $\frac{2}{3}$ | 4.985 |
| $5\frac{1}{2}$ | 5.07 |

TEST II. SUBTRACTION

- | | | | | | |
|---------|-------------|------------------|-------------------|-------------------|---------|
| 1. 7000 | 2. \$758.73 | 3. $\frac{3}{8}$ | 4. $9\frac{5}{6}$ | 5. $4\frac{1}{2}$ | 6. 4.09 |
| 2459 | 298.94 | $\frac{1}{4}$ | $2\frac{1}{3}$ | $2\frac{5}{6}$ | 2.89 |

7. Find the difference between 7 and 3.75.

TEST III. MULTIPLICATION

- | | | | |
|--------|--------|---------------------------------------|------------------------------|
| 1. 654 | 2. 279 | 3. $\frac{5}{6} \times \frac{1}{2} =$ | 4. $\frac{3}{7} \times 14 =$ |
| 3500 | 306 | | |
-
- | | | | |
|---|------------------------------|---|--|
| 5. $\frac{3}{4} \times 10 =$ | 6. $42 \times \frac{5}{6} =$ | 7. $\frac{3}{5} \times \frac{10}{11} =$ | 8. $2\frac{2}{5} \times \frac{3}{4} =$ |
| 9. $3\frac{1}{3} \times 2\frac{1}{5} =$ | 10. \$.40 | 11. 4.08 | |
| | $4\frac{2}{5}$ | 3.05 | |
-
- | | |
|---------------------------|-----------------------|
| 12. Multiply 2.54 by 2.6. | 13. $.25 \times .3 =$ |
|---------------------------|-----------------------|

TEST IV. DIVISION

- | | | | |
|------------------------------------|---------------------------|-------------------------------------|-------------------------|
| 1. $46 \overline{)92157}$ | 2. $18 \overline{)13875}$ | 3. $2300 \overline{)297500}$ | 4. $\frac{5}{6} \div 5$ |
| 5. $\frac{8}{15} \div \frac{1}{3}$ | 6. $7 \div \frac{3}{5}$ | 7. $2\frac{2}{5} \div 1\frac{1}{5}$ | |

The Practice You Need

If you failed any exercise on page 188, you can find by reading this chart where to get the practice you need. For instance, if you failed Exercise 1, Test I, you can find the practice you need on page 8, Exercises 1-8.

TEST I	TEST II	TEST III	TEST IV
1. p. 8, Exs. 1-8	1. p. 12, Test IV	1. p. 17, Test V	1. p. 44, Test IV
2. p. 9, Test V	2. p. 12, Test V	2. p. 17, Test V	2. p. 69, Exs. 1-6
3. p. 60, Exs. 2-3	3. p. 43, Exs. 4-5	3. p. 115	3. p. 91
4. p. 61, Exs. 4-9	4. p. 63, Exs. 6-7	4. p. 113	4. p. 130 Exs. 4-15
5. p. 80, Ex. 20	5. p. 106, Exs. 3-6	5. p. 118	5. p. 129, Exs. 5-9
6. p. 82, Exs. a-g	6-7. p. 159	7. p. 117, Exs. 1-8	6. p. 129, Exs. 1-4
7. p. 87, Exs. 1-4		8. p. 122, Exs. 2-4	7. p. 135
8. p. 157, Exs. 5-10		9. p. 120, Exs. 4-5	
		10. p. 121	
		11-12. p. 165	
		13. p. 166	

Just for Fun

Sam: "Think of any two figures, but don't tell me what they are."

Alice: "All right, I have." (Alice took 4 and 7.)

Sam: "Multiply one of the numbers by 2. Now add 5. Now multiply your answer by 5. Now add the other number you thought of. What is your answer?"

Alice: "72."

Sam (thinking to himself, $72 - 25 = 47$): "Your numbers are 4 and 7."

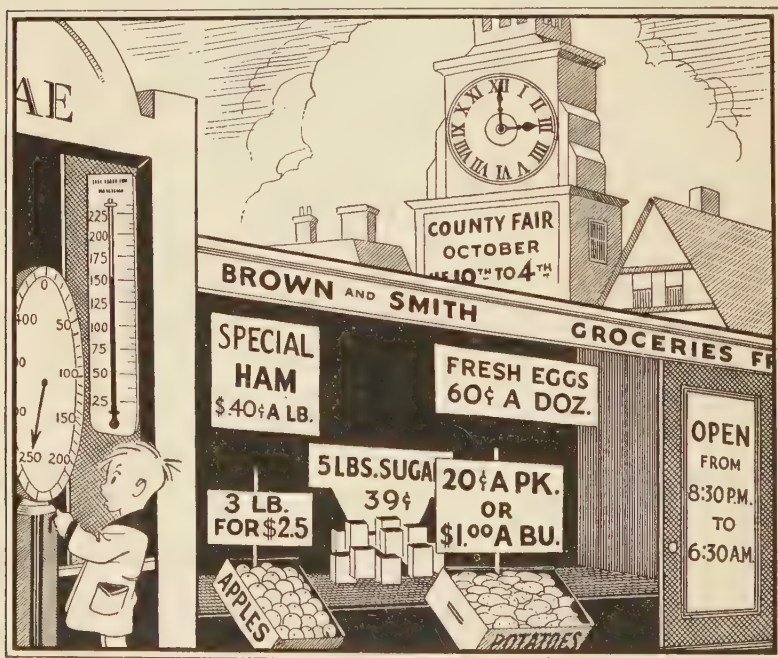
Try it. Just subtract 25 as Sam did and you get the numbers thought of.

Just for Fun*

(1) Once upon a time seven men came to an inn. Each man insisted on having a room to himself. The innkeeper had only six rooms, but he put the first man in a room and then, after thinking a moment, he asked another to wait in the same room for a little while. Then he put the third man in the second room, the fourth man in the third room, the fifth man in the fourth room, and the sixth man in the fifth room. There was still one room vacant; so he went and got the seventh man, whom he had left to wait, and put him in the sixth room. He now had seven men in six rooms, with only one man in each room.

What is wrong with this story?

(2) Can you find eight things wrong in this picture?



GRADE SIX

CHAPTER I

FUNDAMENTALS OF ARITHMETIC

Vacation Uses of Arithmetic



What uses did you find for arithmetic during the summer? Here are some of the uses Miss Allison's sixth-grade pupils found.

Harriet Gray: I kept house for my father and sister. All the recipes in our cookbook make 6 servings. To make enough for 3 servings I took ____ of the amounts. If a recipe called for 6 eggs, I took only ____; if it called for $\frac{1}{2}$ lb. of rice, I used ____ lb.; if it called for $\frac{3}{4}$ cup of milk, I used ____ cup.

Tom Bowers: I sold gasoline this summer. I made a chart (see part of it below) so that I wouldn't make a mistake in giving change.

Continue the table to 10 gallons and fill in all the numbers.

NUMBER OF GALLONS	COST	CHANGE FROM 50¢	CHANGE FROM \$1.00	CHANGE FROM \$2.00	CHANGE FROM \$5.00	CHANGE FROM \$10.00
1	23¢	27¢	77¢	\$1.77	\$4.77	\$9.77
2	46¢	4¢	54¢			
3	69¢					
4						

Arithmetic Practice

The opening day of school Miss Allison's pupils asked her if she would give them some review examples to see how well they could do them. These are the examples she gave them. Can you do them in the time allowed?

ADDITION (*4 minutes*)

1. 8643	2. 8742	3. 5698	4. 9898	5. 6598
289	2876	796	798	8795
6540	98	2965	695	9683
8693	5943	2879	8790	98
487	867	876	4060	7695
2989	9989	9583	875	843
8764	297	954	1954	9878
<u>9387</u>	<u>8695</u>	<u>8769</u>	<u>8697</u>	<u>8769</u>

SUBTRACTION (*3 minutes*)

1. 79977	4. 82998	7. 86659	10. 93539
<u>65878</u>	<u>25473</u>	<u>67641</u>	<u>63452</u>
2. 76888	5. 83970	8. 98756	11. 67741
<u>43417</u>	<u>8018</u>	<u>39391</u>	<u>20938</u>
3. 77751	6. 94068	9. 76210	12. 90000
<u>59865</u>	<u>18608</u>	<u>38974</u>	<u>28769</u>

MULTIPLICATION (*4 minutes*)

1. 3859	2. 4698	3. 2076	4. 4976	5. 386
<u>64</u>	<u>308</u>	<u>59</u>	<u>87</u>	<u>1200</u>

DIVISION (*4 minutes*)

1. $27 \overline{)16587}$	3. $39 \overline{)23684}$	5. $53 \overline{)58643}$
2. $46 \overline{)28765}$	4. $64 \overline{)24320}$	6. $78 \overline{)25687}$

An Experiment!

Look over the paper on which you did the examples on page 192. *Did you make most of your mistakes because you were careless? Were you slow because you were not very sure of your basic facts?* Let's try an experiment! (1) Review the methods of checking examples given below so that you can correct for carelessness. (2) Test your knowledge of the basic facts in addition, subtraction, multiplication, and division and study the ones you don't know well, as directed in the next three pages. (3) Then take the test on page 192 again, checking each example, and see how much better score you can make than you made the first time.

Checking Your Work

Checking addition: Add the columns upward. Then add them downward. If you get the same sum by adding both ways, it is very likely your answer is correct. Make up an example and illustrate.

Checking subtraction: After you have finished your subtraction, add the difference to the subtrahend. If the sum is equal to the minuend, your work is very likely correct. Illustrate.

Checking multiplication: After you have finished a multiplication example, you may interchange the multiplier and multiplicand and multiply again. If the products in the two cases are the same, your answer is probably correct. Some children prefer to check multiplication by just going over the work. Illustrate both methods.

Checking division: After you have finished a division example, multiply the quotient by the divisor. To this product add the remainder. If that sum equals the dividend, it is very likely that your answer is correct. Illustrate.

100 Addition Facts

Give the answers to these facts orally. Then write the answers to all the facts on folded paper in *four* minutes. If you make an error in any fact, study that fact and take the test again. Keep practicing until you know every fact. (See page xiv.)

1.	$\begin{array}{r} 7 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 9 \\ \hline \end{array}$
2.	$\begin{array}{r} 7 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 6 \\ \hline \end{array}$
3.	$\begin{array}{r} 1 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 1 \\ \hline \end{array}$
4.	$\begin{array}{r} 6 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 3 \\ \hline \end{array}$
5.	$\begin{array}{r} 8 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 0 \\ \hline \end{array}$
6.	$\begin{array}{r} 2 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 3 \\ \hline \end{array}$
7.	$\begin{array}{r} 7 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 3 \\ \hline \end{array}$
8.	$\begin{array}{r} 0 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 9 \\ \hline \end{array}$
9.	$\begin{array}{r} 5 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 9 \\ \hline \end{array}$
10.	$\begin{array}{r} 9 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 7 \\ \hline \end{array}$

100 Subtraction Facts

See the directions at the top of page 194.

1.	$\begin{array}{r} 6 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 5 \\ \hline \end{array}$
2.	$\begin{array}{r} 9 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 6 \\ \hline \end{array}$
3.	$\begin{array}{r} 3 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 4 \\ \hline \end{array}$
4.	$\begin{array}{r} 8 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 2 \\ \hline \end{array}$
5.	$\begin{array}{r} 10 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 4 \\ \hline \end{array}$
6.	$\begin{array}{r} 11 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 7 \\ \hline \end{array}$
7.	$\begin{array}{r} 12 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ 6 \\ \hline \end{array}$
8.	$\begin{array}{r} 8 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 9 \\ \hline \end{array}$
9.	$\begin{array}{r} 15 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 6 \\ \hline \end{array}$
10.	$\begin{array}{r} 12 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 9 \\ \hline \end{array}$

100 Multiplication Facts

Turn to page 194 and answer all those hundred facts as though they were multiplication examples. Follow the directions given for the addition facts.

90 Division Facts

See the directions at the top of page 194.

1. $5 \overline{)30}$ $2 \overline{)18}$ $1 \overline{)4}$ $5 \overline{)25}$ $3 \overline{)0}$ $7 \overline{)35}$ $1 \overline{)5}$ $4 \overline{)8}$ $9 \overline{)0}$

2. $1 \overline{)3}$ $5 \overline{)35}$ $3 \overline{)3}$ $9 \overline{)81}$ $7 \overline{)42}$ $8 \overline{)8}$ $7 \overline{)28}$ $8 \overline{)0}$ $4 \overline{)12}$

3. $3 \overline{)6}$ $2 \overline{)16}$ $5 \overline{)40}$ $7 \overline{)49}$ $1 \overline{)2}$ $8 \overline{)16}$ $4 \overline{)16}$ $9 \overline{)9}$ $7 \overline{)21}$

4. $2 \overline{)14}$ $3 \overline{)9}$ $7 \overline{)56}$ $5 \overline{)45}$ $9 \overline{)72}$ $6 \overline{)0}$ $8 \overline{)24}$ $7 \overline{)14}$ $5 \overline{)20}$

5. $1 \overline{)1}$ $7 \overline{)63}$ $3 \overline{)12}$ $5 \overline{)15}$ $4 \overline{)20}$ $7 \overline{)7}$ $9 \overline{)63}$ $6 \overline{)6}$ $8 \overline{)32}$

6. $8 \overline{)56}$ $2 \overline{)12}$ $5 \overline{)10}$ $4 \overline{)24}$ $7 \overline{)0}$ $9 \overline{)54}$ $6 \overline{)12}$ $3 \overline{)15}$ $8 \overline{)40}$

7. $2 \overline{)10}$ $5 \overline{)5}$ $4 \overline{)28}$ $6 \overline{)54}$ $9 \overline{)45}$ $6 \overline{)18}$ $4 \overline{)4}$ $3 \overline{)18}$ $8 \overline{)48}$

8. $5 \overline{)0}$ $4 \overline{)32}$ $6 \overline{)48}$ $9 \overline{)36}$ $6 \overline{)24}$ $1 \overline{)6}$ $3 \overline{)21}$ $2 \overline{)2}$ $1 \overline{)0}$

9. $4 \overline{)36}$ $6 \overline{)42}$ $9 \overline{)27}$ $6 \overline{)30}$ $2 \overline{)8}$ $4 \overline{)0}$ $8 \overline{)64}$ $2 \overline{)0}$ $3 \overline{)24}$

10. $6 \overline{)36}$ $2 \overline{)6}$ $1 \overline{)7}$ $9 \overline{)18}$ $1 \overline{)8}$ $8 \overline{)72}$ $2 \overline{)4}$ $1 \overline{)9}$ $3 \overline{)27}$

Now go back and see how much you can improve your score on the examples on page 192.

Ten Easy Problems

Tell the missing numbers in these problems. Do not use pencil or paper in finding the answers.

1. My father bought me a book of 50 trolley tickets. I use two tickets every day for school; so the book will last me ____ weeks of school.

2. My mother bought a half-dozen napkins at 75¢ each. They cost ____.

3. Two 7-cent spools of thread, a 10-cent package of needles, and an 8-cent card of buttons will cost ____ all together.

4. I had 63¢ in my pocketbook. I bought a 15-cent sponge cake, and when I got home there was only 29¢ in my pocketbook. I must have lost the other ____ cents.

5. Mother bought a half-dozen cakes of Violet Soap at a sale where they were selling 3 cakes for 19 cents. The half-dozen cakes cost her ____.

6. The first day of school my father gave me a quarter to buy some supplies. I bought an eraser and a ruler for 5¢ each and spent the rest for pencils that were two for 5¢. I got ____ pencils.

7. One half pound of wafers at 30¢ a lb. and $1\frac{1}{4}$ lb. of butter at 60¢ a pound will cost ____.

8. Spinach should be cooked 20 minutes. If you want to have dinner ready at 12:15, the spinach should be put on to cook at ____ minutes of ____.

9. We are having a church supper and expect to serve 300 persons. Allowing 3 pk. of potatoes for each 100 persons, we shall need ____ pk., or ____ bu. ____ pk., of potatoes for the supper.

10. We figure that we shall need 5 meat pies, with 4 lb. of meat in each, for each 100 persons; so we shall have to buy ____ lb. of meat for the 300 persons.

What You Know

Tell how these sentences should be finished:

1. $18 \overline{)1356}$ The first quotient figure in this example is ____.
2. Using a scale of $\frac{1}{2}$ in. to a mile, a line $1\frac{1}{2}$ in. long represents a distance ____ miles long.
3. $\frac{9}{8}$ is an ____ fraction; $\frac{5}{9}$ is a ____ fraction.
4. $4\frac{1}{5}$ is a ____ number.
5. 2 sq. ft. = ____ sq. in.
6. 7 sq. yd. = ____ sq. ft.
7. 12 yd. = ____ ft.
8. 72 in. = ____ ft.
9. 12 wk. = ____ da.
10. ____ doz. = 1 gross.
11. There are 30 days in the months of ____, ____, ____, and ____.
12. In the fraction $\frac{7}{8}$, 7 is the ____ and 8 is the ____.
13. To reduce a fraction to lower terms, ____ both the ____ and the ____ by the same number.
14. The lowest common denominator of $\frac{5}{12}$, $\frac{5}{6}$, and $\frac{1}{2}$ is ____.
15. The number (5,576,000) is read . . .
16. $\frac{3}{4}$ lb. of ham at 48¢ a pound will cost ____ cents.
17. The average of 6, 3, and 9 is ____.
18. $1 - \frac{5}{8} = ?$
19. 1 oz. = $\frac{1}{7}$ of a pound; so 5 oz. = $\frac{?}{7}$ of a pound.
20. One foot is ____ of a yard.
21. To find the difference between two numbers you ____.
22. To find the product of two numbers you should ____.
23. You add to find the ____ of any numbers.
24. The perimeter of any rectangle means . . .
25. Three fifths equals ____ tenths.

Reading the Newspaper

You cannot read a newspaper intelligently unless you can read and know the meaning of large numbers.

(1) 2,456,287 is read : ____ million, ____ thousand, ____.

(2) 2,463,587,284 is read : ____ billion, ____ million, ____ thousand, ____.

(3) 18,254,056,198 is read : ____ billion, ____ million, ____ thousand, ____.

See if you can read this clipping from a New York newspaper without making any mistakes in reading the numbers.

A CLIPPING FROM A NEW YORK NEWSPAPER

WASHINGTON, July 10.—Tax collections of the Internal Revenue Bureau in the fiscal year 1927 totaled \$2,865,695,509.86, as compared with \$2,835,999,892.19 in 1926, an increase of \$29,695,617.67. Income taxes were \$2,219,831,014.41 in 1927, as compared with \$1,974,104,141.33 in 1926, a gain of \$245,726,873.08, and miscellaneous taxes \$645,864,495.45, as against \$861,895,750.86.

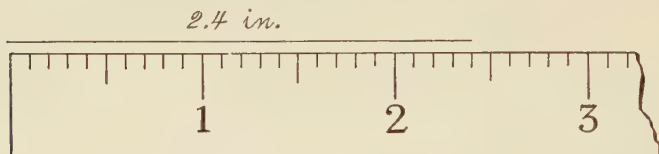
As usual, New York led all other States, with income taxes of \$649,273,563.84, and miscellaneous taxes of \$105,729,587.18, a total of \$755,003,151.01, or more than a fourth of the collections for the entire country.

Look in newspapers and magazines for all the large numbers you can find. If possible, bring them to school and see if the class can read them.

Ask your teacher to dictate some large numbers, to see if you can write them.

Decimals

Bill's uncle draws plans for houses. Each inch on the ruler he uses is divided into 10 equal parts. Here is a picture of part of the ruler and a line that he has just drawn. The line is $2\frac{4}{10}$



inches long. His uncle has written the $2\frac{4}{10}$ a short way? We say he has written it as a decimal. $.4$ means $\frac{4}{10}$ and is read 4 tenths. 2.5 means $2\frac{5}{10}$ and is read ____ and ____ tenths.

Bill's uncle also has a steel tape that he uses for measuring land. One foot on the steel tape is divided into 100 parts. Each part of the foot is $\frac{1}{100}$ of a foot long. When he measured a lot that was $20\frac{25}{100}'$ by $30\frac{75}{100}'$, he wrote $20.25'$ by $30.75'$. He said the lot was 20 *and* 25 hundredths feet by 30 *and* 75 hundredths feet. Do you see that $.25$ means $\frac{25}{100}$ and is read 25 hundredths? What does $.75$ mean?

How do you read 7.5? What word do you say when you come to the decimal point? How do you read 8.25?

Read these decimals and tell what each means:

1. .1	.2	.3	1.4	2.5	7.8	9.9
2. .01	.02	.03	.16	1.25	2.17	3.85
3. .75	7.5	8.2	.82	5.06	.07	.70
4. .63	2.9	4.6	.09	8.08	2.87	3.04

Write these fractions and mixed numbers as decimals:

5. $\frac{5}{10}$	$2\frac{5}{10}$	$\frac{5}{100}$	$2\frac{5}{100}$	$\frac{3}{10}$	$1\frac{3}{10}$	$1\frac{3}{100}$
6. $\frac{7}{10}$	$2\frac{7}{10}$	$2\frac{7}{100}$	$5\frac{25}{100}$	$6\frac{45}{100}$	$8\frac{8}{10}$	$8\frac{8}{100}$

Fractions whose denominators are 1,000, 10,000, 100,000, and 1,000,000 can also be written as decimals. The work on the next page will help you to read and write such decimals.

Reading Decimals

Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Units	Decimal point	Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thousandths	Millionths			
4	,	2	9	,	6	,	8	5	7	.	1	2	3	4	5	6

9.1 is read 9 *and* 1 tenth.

9.12 is read 9 *and* 12 hundredths.

9.123 is read 9 *and* 123 thousandths.

9.1234 is read 9 *and* 1,234 ten-thousandths.

9.12345 is read 9 *and* 12,345 hundred-thousandths.

9.123456 is read 9 *and* 123,456 millionths.

Read these numbers:

1. 4567.	2. .456089	3. 25.4681
456.7	4.56089	.34908
45.67	45.6089	.00605
4.567	456.089	2.45003
.4567	4,560.89	53.535
.04567	45,608.9	637.0045
.004567	456,089	.000327

NOTE. Ten-thousandths, hundred-thousandths, and millionths are not used as often as tenths, hundredths, and thousandths.

4. Ask your teacher to dictate some decimals to see if you can write them.

5. If a mile is divided into 10 equal parts, each part is called one ____ of a mile. If a mile is divided into 100 equal parts, each part is called one ____ of a mile. Which is greater, .1 mile or .01 mile? How many times as great?

Adding Decimals

1. Ted is practicing for the 100-yard dash in the City Track Meet. He has run it every school day this week and his running times are 15.5 sec., 15.7, 15.2, 15.2, 14.9 sec. What is his average time for the 100-yard dash? This is the way he found out.

$$\begin{array}{r}
 15.5 \\
 15.7 \\
 15.2 \\
 15.2 \\
 14.9 \\
 \hline
 5 \overline{)76.5} \\
 \underline{15.3 \text{ sec.}}
 \end{array}$$

Do you agree with his work? Do you notice that he was careful to keep his decimal points in a straight column when he added? Did he need to put the decimal point in the answer?

2. Paul is practicing for the same race. His records for this week are 15.5 sec., 15.4, 15.2, 15.4, 14.8 sec. Which boy seems to have the better chance of winning in the track meet tomorrow?

Add:

$$\begin{array}{r}
 \text{3. } 9.864 \\
 2.879 \\
 5.874 \\
 .069 \\
 .598 \\
 \underline{2.764}
 \end{array}$$

$$\begin{array}{r}
 \text{4. } 8.987 \\
 .569 \\
 9.843 \\
 .986 \\
 9.879 \\
 \underline{.869}
 \end{array}$$

$$\begin{array}{r}
 \text{5. } 19.86 \\
 29.87 \\
 9.95 \\
 87.63 \\
 9.89 \\
 \underline{76.35}
 \end{array}$$

$$\begin{array}{r}
 \text{6. } 56.84 \\
 9.75 \\
 67.83 \\
 5.79 \\
 86.32 \\
 \underline{9.75}
 \end{array}$$

[Copy in columns and add:]

7. 56.8, 49.7, 86.3, 98.8, 46.2.
8. 26.38, 48.56, 98.74, 89.96, 58.97.
9. 54.382, 96.974, 79.276, 84.395, 99.864.
10. 2.683, 9.297, 8.763, 5.948, .297, .864.
11. 5.876, .075, 9.660, 8.750, 9.876, .007.

Subtracting Decimals

1. The speedometer on our car registered 2986.7 miles when we started on a trip and 3186.2 miles when we returned. Do you know how many miles we had driven? This is the way I found out. Do you agree with my work? Notice the way the decimal points are kept in a straight column.

$\begin{array}{r} 3186.2 \\ 2986.7 \\ \hline 199.5 \end{array}$

2. The speed limit in our town is 20 miles an hour. Mr. Miller was driving at a rate of 18.8 miles an hour, yesterday. He would have been allowed to drive ____ miles an hour faster.

3. The German coin called the Reichsmark is worth \$.238. How much less than a quarter is a Reichsmark worth?

Subtract:

4.
$$\begin{array}{r} 89.72 \\ 26.75 \\ \hline \end{array}$$

5.
$$\begin{array}{r} 25.000 \\ 24.976 \\ \hline \end{array}$$

6.
$$\begin{array}{r} 23.70 \\ 1.98 \\ \hline \end{array}$$

7.
$$\begin{array}{r} 26.321 \\ 5.698 \\ \hline \end{array}$$

8.
$$\begin{array}{r} 90.006 \\ 17.777 \\ \hline \end{array}$$

9.
$$\begin{array}{r} 28.263 \\ 9.989 \\ \hline \end{array}$$

10.
$$\begin{array}{r} 32.670 \\ 4.894 \\ \hline \end{array}$$

11.
$$\begin{array}{r} 32.765 \\ 19.863 \\ \hline \end{array}$$

Subtract:

12. 29.867 from 35.862

17. 34.65 from 50.28

13. 9.86 from 379.21

18. .864 from 27.456

14. 268.9 from 453.0

19. 28.2 from 386.07

15. 75.254 from 125.54

20. 56.45 from 218.9

16. 285.63 from 962.75

21. 67.43 from 68.13

22. *Subtract* two and five hundredths *from* nine and two hundredths.

23. *Take* three and thirty-five thousandths *from* twenty-one and twenty-five hundredths.

24. *From* fifty *take* twenty-three and nine tenths.

25. *Subtract* seventy-five hundredths *from* one and two tenths.

Multiplying Decimals

The iron fencing my father is buying for our yard costs \$2.25 a foot. He needs 18.5 ft. of it. How do you find how much it will cost?

\$2.25
18.5
1125
1800
225
\$41625

(1) 18.5 is nearly 20. \$2.25 is a little more than \$2.00. Is the product about \$4000, \$400, \$40, or \$4?

(2) Do you know where to place the decimal point in the answer?

1. Show that these answers seem reasonable.

$$\begin{array}{r} 3.27 \\ \times 1.2 \\ \hline 654 \\ 327 \\ \hline 39.24 \end{array}$$

2 decimal places

2 decimal places

$$\begin{array}{r} 3.25 \\ \times 2.5 \\ \hline 1625 \\ 650 \\ \hline 8.125 \end{array}$$

3 decimal places

3 decimal places

To find the product of decimals, multiply the numbers, then point off from the right in the product as many decimal places as there are in the multiplier and the multiplicand together.

Do each of these examples without looking at the work in the book. Then look to see if you got them all correct. Don't forget the decimal points.

(1) $\begin{array}{r} .25 \\ .63 \\ \hline 75 \\ 150 \\ \hline .1575 \end{array}$	(2) $\begin{array}{r} 1.35 \\ 28 \\ \hline 1080 \\ 270 \\ \hline 37.80 \end{array}$	(3) $\begin{array}{r} 2.75 \\ .83 \\ \hline 825 \\ 2200 \\ \hline 2.2825 \end{array}$	(4) $\begin{array}{r} .281 \\ .015 \\ \hline 1405 \\ 281 \\ \hline .004215 \end{array}$
(5) $\begin{array}{r} .016 \\ .06 \\ \hline .00096 \end{array}$	(6) $\begin{array}{r} .038 \\ .7 \\ \hline .0266 \end{array}$	(7) $\begin{array}{r} 9.9 \\ .009 \\ \hline .0891 \end{array}$	(8) $\begin{array}{r} .29 \\ .07 \\ \hline .0203 \end{array}$

2. In Ex. (4) above .281 has ____ decimal places and .015 has ____ decimal places. You must point off ____ decimal places in the answer. To do this it is necessary to write ____ zeros before the 4215.

Multiplying and Reading Decimals

In pointing off your answers to these multiplications use the rule given on page 204. When you read your answers, be sure to see whether they are reasonable.

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $\begin{array}{r} 456 \\ 2.09 \\ \hline \end{array}$	$\begin{array}{r} 37.5 \\ 2.8 \\ \hline \end{array}$	$\begin{array}{r} 543.8 \\ 27.59 \\ \hline \end{array}$	$\begin{array}{r} 5.06 \\ .25 \\ \hline \end{array}$
2. $\begin{array}{r} 38.7 \\ 2.9 \\ \hline \end{array}$	$\begin{array}{r} 354.9 \\ .01 \\ \hline \end{array}$	$\begin{array}{r} .98 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} .968 \\ .08 \\ \hline \end{array}$
3. $\begin{array}{r} 38.54 \\ 2.3 \\ \hline \end{array}$	$\begin{array}{r} 387.5 \\ .25 \\ \hline \end{array}$	$\begin{array}{r} 986.3 \\ .01 \\ \hline \end{array}$	$\begin{array}{r} .583 \\ .387 \\ \hline \end{array}$
4. $\begin{array}{r} 95.4 \\ 82.3 \\ \hline \end{array}$	$\begin{array}{r} .076 \\ 54 \\ \hline \end{array}$	$\begin{array}{r} .976 \\ .87 \\ \hline \end{array}$	$\begin{array}{r} .653 \\ .29 \\ \hline \end{array}$
5. $\begin{array}{r} 5.43 \\ 2800 \\ \hline \end{array}$	$\begin{array}{r} 2.75 \\ 100 \\ \hline \end{array}$	$\begin{array}{r} 86.3 \\ 10 \\ \hline \end{array}$	$\begin{array}{r} 25.438 \\ 10 \\ \hline \end{array}$

6. Find the cost of 2.8 tons of coal at \$9.90 a ton.
7. Traveling at the rate of 22.5 miles an hour, how far can you go in 3.8 hours?
8. Find the cost of 100 lb. of chicken feed at \$.04 a pound.
9. How far can an airplane go in 4.5 hours if it travels at a rate of 89.9 miles an hour?
10. An automobile can travel 16.5 miles on one gallon of gas. At that rate how far can it travel on 2.5 gal.?
11. A dairyman sold 29.8 lb. of cream at \$.35 a pound. How much did he get for it?

Helpful Short Cuts

(1) Are these multiplications correct?

$$\begin{array}{r} .1254 \\ \times 10 \\ \hline 1.2540 \end{array}$$

or 1254

$$\begin{array}{r} 1.254 \\ \times 10 \\ \hline 12.540 \end{array}$$

or 1254

$$\begin{array}{r} 12.54 \\ \times 10 \\ \hline 125.40 \end{array}$$

or 125.4

$$\begin{array}{r} 125.4 \\ \times 10 \\ \hline 1254.0 \end{array}$$

or 1254

Multiplying a number by 10 moves the decimal point one place to the right.

(2) Are these multiplications correct?

$$\begin{array}{r} .1254 \\ \times 100 \\ \hline 12.5400 \end{array}$$

or 1254

$$\begin{array}{r} 1.254 \\ \times 100 \\ \hline 125.400 \end{array}$$

or 125.4

$$\begin{array}{r} 12.54 \\ \times 100 \\ \hline 1254.00 \end{array}$$

or 1254.

$$\begin{array}{r} 125.4 \\ \times 100 \\ \hline 12540.0 \end{array}$$

or 12540.

Multiplying a number by 100 moves the decimal point ____ places to the right.

(3) Are these multiplications correct?

$$\begin{array}{r} .1254 \\ \times 1000 \\ \hline 125.4000 \end{array}$$

or 1254

$$\begin{array}{r} 1.254 \\ \times 1000 \\ \hline 1254.000 \end{array}$$

or 1254.

$$\begin{array}{r} 12.54 \\ \times 1000 \\ \hline 12540.00 \end{array}$$

or 12540

$$\begin{array}{r} 125.4 \\ \times 1000 \\ \hline 125400.0 \end{array}$$

or 125400.

Multiplying a number by 1000 moves the decimal point . . .

$$.1254 \times 10 = \underset{\curvearrowright}{1.254}$$

$$125.4 \times 10 = 125\underset{\curvearrowright}{4}$$

$$.1254 \times 100 = \underset{\curvearrowright}{12.54}$$

$$125.4 \times 100 = 125\underset{\curvearrowright}{40}$$

$$.1254 \times 1000 = \underset{\curvearrowright}{125.4}$$

$$125.4 \times 1000 = 125\underset{\curvearrowright}{400}$$

To multiply a number

by 10, move the decimal point 1 place to the right.

by 100, move the decimal point 2 places to the right.

by 1000, move the decimal point 3 places to the right.

Notice that to multiply 125.4 by 1000 we have to annex 2 zeros.

Using Short Cuts

Multiply orally by 10; by 100; by 1000:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
1. 4.568	5.6342	.05436	.035	45.863
2. 29.87	39.07	.0048	.7902	9.025
3. .24	.7	.57	300	.85
4. 1.047	.53	8	8.6	7

Do not use a pencil in working these problems:

5. Hartland City pays \$2.90 a day to each of the men it sends out to clear the snow from its streets. How much does it cost the city a day to send out a gang of 100 men? of 1000 men?

6. At 2¢ each what is the cost of 10 cards? 100 cards? 1000 cards?

7. The Leland Hotel charges its guests \$4.50 a day. How much would it cost to stay there for 10 days?

8. A field is 75.5 ft. wide and 100 ft. long. What is its area?

9. The N.R.C. Railroad charges its passengers \$.029 a mile. How much will it charge for a ticket for a thousand-mile trip?

10. Find the cost of 100 lb. of flour at 5¢ a pound.

11. I can buy colored paper for 2¢ a sheet, but if I buy a pack of 100 sheets, I can get it for \$1.75. How much do I save by buying a pack of the paper instead of buying 100 sheets one at a time?

12. Pen points cost 1¢ each, but I can buy a box containing 1000 of them for \$9.25. How much do I save by buying a box of pen points instead of buying 1000 of them one at a time?

Problem Study

Do the problems on this page. If you have difficulty with the first one, try Problem 1 on page 209. Then come back and try Problem 1 on this page again. Do the same for each of the other problems.

1. If a train travels at the rate of 42 miles an hour, how far will it go in $4\frac{1}{2}$ hours?

2. Donald wants a tennis racket that costs \$7.50. He wants to earn the money by selling magazines. He buys the magazines for 12¢ each and sells them at 15¢ each. He wonders how many magazines he must sell to earn enough money for his tennis racket. Can you tell him?

3. Father was going to New York on the 3:55 train. He called up the station to find out whether or not the train would be on time, and they told him it would be 2 hours and a quarter late. That means the train will leave at ____.

4. Mrs. Smith bought $3\frac{1}{2}$ yd. of cloth at 50¢ a yard and $\frac{1}{2}$ doz. of buttons at 75¢ a dozen. She paid for them with a 5-dollar bill and received \$2.97 in change. Was her change correct?

5. Mrs. Brown bought Jimmy a 22-dollar suit and a 24-dollar overcoat at a clothing sale at which she got $\frac{1}{3}$ off the regular prices. How much did she have to pay for the suit and overcoat together?

6. What will the clover seed for a 20-acre field cost if you allow 1 pk. of clover seed to an acre and pay \$12.50 a bushel for it?

7. One morning when Mr. Carter started out in his automobile, his speedometer registered 2075 miles and his gasoline gauge showed that he had 9 gal. of gas in the tank. When the gauge showed that he had only 1 gal. of gas left in the tank, he stopped to buy more. At that time his speedometer registered 2211 miles. How far can he go in his car on a gallon of gas?

Problem Helps

If you did all the problems on page 208 correctly the first time you tried them, you need not do the problems on this page.

1. (a) An automobile going at the rate of 26 miles an hour travels for 2 hours. (b) Will it go twice as far in two hours as it does in one hour? (c) How far will it go in two hours? in $3\frac{1}{2}$ hours?

2. (a) If you buy a newspaper for 3¢ and sell it for 5¢, how much do you earn on the paper? (b) If you earn 2¢ on each paper, how many will you have to sell to earn 4¢? 6¢? 10¢? 50¢?

3. (a) If a train due to leave at 4:45 is an hour late, it will leave at ____; if it is an hour and a quarter late, it will leave at ____; if it is an hour and 20 minutes late, it will leave at ____.

4. (a) $3\frac{1}{2}$ yd. of lace at 10¢ a yard will cost _____. (b) $\frac{1}{2}$ doz. buttons at 12¢ a dozen will cost _____. (c) The lace and buttons together will cost _____. (d) If I pay for both with a dollar bill, I will get _____¢ change.

5. (a) If I get $\frac{1}{3}$ off a 6-dollar sweater, I will get _____ dollars off. That means I will pay _____ dollars for the sweater. (b) If I get $\frac{1}{3}$ off a 2-dollar cap, I will get _____ cents off. That means I will pay _____ for the cap. (c) For both together I will pay _____.

6. (a) If you need 1 pk. of seed for 1 acre, for 16 acres you will need _____ pk. (b) 16 pk. = _____ bu. (c) 4 bu. of seed at \$10.00 a bushel will cost _____.

7. (a) If you have 7 gal. of gas in an automobile when you start and 2 gal. left when you stop, you have used _____ gal. (b) If the speedometer registers 2000 miles when you start and 2100 when you stop, you have gone _____ miles. (c) If it takes 5 gal. of gas to go 100 miles, the car will go _____ miles on 1 gal. of gas.

Marking a Test Paper

Here is a test paper belonging to Margaret Bird. Go over it carefully and tell what mark she should have on it. Give her 1 point for each example that she has correct. Do not give credit for any example in which she has not reduced the answer to simplest form.

Arithmetic, Margaret Bird. October 13.

1. $\frac{5}{6} + \frac{1}{6} = \frac{6}{6} = 1$ Ans.

8. $\frac{3}{20} + \frac{7}{20} + \frac{9}{20} = \frac{19}{20}$ Ans.

2. $5\frac{7}{10} = 5\frac{7}{10}$
 $+ \frac{1}{2} = \frac{5}{10}$

 $5\frac{12}{10} = 6\frac{2}{10} = 6\frac{1}{5}$ Ans.

9. $4\frac{3}{16} = 4\frac{3}{16}$
 $2\frac{1}{4} = 2\frac{4}{16}$
 $5\frac{5}{8} = 5\frac{10}{16}$

 $11\frac{17}{16}$ Ans.

3. $\frac{2}{5} = \frac{4}{10}$
 $+ \frac{1}{2} = \frac{5}{10}$

 $\frac{9}{10}$ Ans.

10. $\frac{1}{8} + \frac{3}{16} = \frac{5}{16}$ Ans.

4. $5\frac{1}{2} = 5\frac{4}{8}$
 $+ 2\frac{7}{8} = 2\frac{7}{8}$

 $7\frac{11}{8}$ Ans.

11. $2\frac{3}{8} = 2\frac{3}{8}$
 $+ 4\frac{3}{4} = 4\frac{6}{8}$

 $6\frac{9}{8} = 7\frac{1}{8}$ Ans.

12. $\frac{1}{5} + \frac{3}{10} = \frac{5}{10} = \frac{1}{2}$ Ans.

5. $\frac{1}{3} = \frac{4}{12}$
 $+ \frac{3}{4} = \frac{9}{12}$

 $\frac{13}{12} = 1\frac{1}{12}$ Ans.

13. $\frac{3}{4} = \frac{9}{12}$
 $+ \frac{2}{3} = \frac{8}{12}$

 $\frac{17}{12} = 1\frac{5}{12}$ Ans.

6. $3\frac{5}{9} = 3\frac{5}{9}$
 $+ 5\frac{2}{3} = 5\frac{6}{9}$

 $8\frac{11}{9} = 9\frac{3}{9} = 9\frac{1}{3}$ Ans.

14. $\frac{1}{6} = \frac{6}{12}$
 $+ \frac{1}{4} = \frac{3}{12}$

 $\frac{5}{12}$ Ans.

7. $3\frac{7}{10} = 3\frac{7}{10}$
 $+ 5\frac{3}{5} = 5\frac{6}{10}$

 $8\frac{13}{10} = 8\frac{3}{10}$ Ans.

15. $\frac{2}{5} + \frac{1}{2} = \frac{9}{10}$ Ans.

Preparing to Add Fractions

If you can complete these sentences correctly, you should not have any trouble in doing the examples on the next page.

1. $\frac{7}{8}$ and $\frac{5}{8}$ can be added without being changed because they have the same ____.

2. Before $\frac{5}{12}$ and $\frac{3}{4}$ can be added, the $\frac{3}{4}$ should be changed to the fraction $\frac{?}{?}$.

3. In adding $\frac{3}{4}$ and $\frac{2}{3}$ you should use ____ as a common denominator.

4. In adding $\frac{3}{8}$ and $\frac{1}{8}$ you add the ____ and ____ and place the sum, 4, over the common denominator, which is ____.

5. To change $\frac{5}{6}$ to a fraction whose denominator is 18, both the ____ and the ____ must be multiplied by ____.

6. To reduce a fraction to lower terms, both the ____ and the ____ must be ____ by the same number.

7. In adding mixed numbers the ____ are added first, and then the ____ numbers.

8. The answer $6\frac{5}{8}$ is not in simplest form. It should be changed to ____.

9. The answer $6\frac{4}{8}$ is not in simplest form. It should be changed to ____.

10. The answer $8\frac{10}{8}$ is not in simplest form. It should first be changed to ____, and then to ____.

11. A common denominator of $\frac{2}{3}$ and $\frac{5}{6}$ is 18, but the smallest common denominator is ____.

12. A common denominator of any fractions may be found by multiplying their ____ together, but that is not always the ____ common denominator.

Practice in Adding Fractions

EASY PRACTICE

1. $\frac{1}{4} + \frac{1}{2} =$
2. $\frac{5}{8} + \frac{2}{8} =$
3. $\frac{5}{12} + \frac{6}{12} =$
4. $\frac{5}{6} + \frac{1}{12} =$
5. $\frac{1}{2}$
 $\frac{1}{4}$
 $\frac{1}{8}$
6. $\frac{5}{12}$
 $\frac{1}{6}$
7. $2\frac{1}{6}$
 $5\frac{1}{3}$
8. $\frac{1}{4}$
 $\frac{1}{3}$
9. $\frac{1}{16}$
 $\frac{3}{8}$
 $\frac{1}{4}$
10. $5\frac{1}{5}$
 $2\frac{1}{10}$
3
11. $\frac{5}{6}$
 $\frac{1}{6}$
12. $3\frac{7}{8}$
5
6

HARDER PRACTICE

1. $\frac{3}{4} + \frac{1}{2} =$
2. $\frac{5}{8} + \frac{1}{2} =$
3. $\frac{5}{8} + \frac{5}{8} =$
4. $\frac{1}{6} + \frac{2}{3} =$
5. $\frac{1}{2}$
 $\frac{3}{4}$
 $\frac{1}{8}$
6. $\frac{1}{12}$
 $\frac{2}{3}$
7. $2\frac{5}{6}$
 $3\frac{1}{3}$
8. $\frac{3}{4}$
 $\frac{9}{16}$
9. $\frac{5}{16}$
 $\frac{1}{8}$
 $\frac{9}{16}$
10. $5\frac{5}{12}$
4
 $8\frac{7}{12}$
11. $2\frac{5}{8}$
 $3\frac{3}{4}$
12. $2\frac{7}{8}$
5\frac{3}{4}

STILL HARDER PRACTICE

1. $\frac{5}{8} + \frac{1}{8} + \frac{1}{2} =$
2. $\frac{3}{12} + \frac{3}{4} + \frac{1}{12} =$
3. $\frac{5}{9} + \frac{5}{9} + \frac{8}{9} =$
4. $\frac{2}{3} + \frac{5}{6} =$
5. $\frac{1}{2}$
 $\frac{3}{4}$
 $\frac{1}{8}$
 $\frac{3}{8}$
6. $2\frac{5}{12}$
 $9\frac{3}{4}$
4
7. $\frac{7}{8}$
 $9\frac{1}{2}$
 $5\frac{1}{4}$
8. $\frac{7}{16}$
 $\frac{3}{4}$
 $\frac{5}{8}$
9. $\frac{7}{12}$
 $\frac{3}{4}$
 $\frac{2}{3}$
 $\frac{1}{6}$
10. $1\frac{1}{2}$
 $\frac{3}{4}$
 $2\frac{5}{6}$
11. $4\frac{3}{8}$
 $2\frac{1}{2}$
 $5\frac{5}{16}$
12. $3\frac{5}{12}$
 $2\frac{5}{6}$
9

PROBLEMS

1. A baker had left $\frac{2}{3}$ of one sponge cake and $\frac{1}{4}$ of another. Mrs. Mercer said that she would take both pieces. The baker said: " $\frac{2}{3}$ of a cake and $\frac{1}{4}$ of a cake is $\frac{?}{?}$ of a cake. Since a whole cake sells for 60¢, you owe me ____ for these pieces."

2. If candy sells for 60¢ a pound, for 1¢ I should get $\frac{1}{60}$ of a pound; so for 5¢ I should get 5 times as much or ____ sixtieths of a pound. ($\frac{5}{60} = \frac{1}{12}$.) What part of a pound should I get for 10¢? 15¢? 20¢?

Preparing to Subtract Fractions

If you can complete these sentences correctly, you should not have any trouble in doing the examples on the next page.

1. $\frac{5}{8}$ can be subtracted from $\frac{7}{8}$ without changing either fraction because they have a common ____.

2. Before $\frac{5}{12}$ can be subtracted from $\frac{3}{4}$, the $\frac{3}{4}$ should be changed to the fraction $\frac{?}{?}$.

3. In subtracting $\frac{1}{8}$ from $\frac{5}{8}$ you subtract the ____ from the ____ and write the difference above the common denominator.

4. In subtracting mixed numbers the ____ are subtracted first and then the ____ numbers.

5. To subtract $\frac{5}{8}$ from 1, you must think of the 1 as ____.

6.

$6\frac{1}{3}$ $2\frac{2}{3}$

 In doing this subtraction you must think of the $6\frac{1}{3}$ as ____.

7.

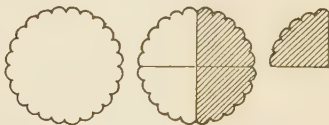
$7\frac{1}{4}$ $3\frac{5}{12}$
--

 In doing this subtraction you must think of the $7\frac{1}{4}$ as $7\frac{?}{12}$, and then as $6\frac{?}{12}$.

8. In subtracting $2\frac{5}{8}$ from 7 you must think of the 7 as ____.

9. A common denominator of $\frac{3}{8}$ and $\frac{3}{4}$ is 32, but the smallest common denominator is ____.

10. This picture shows that $2\frac{1}{4}$ cookies less $\frac{3}{4}$ of a cookie (the shaded part) leaves ____ cookies.
 $2\frac{1}{4} - \frac{3}{4} = ?$



11. Complete: To subtract fourths from thirds, we should think of them as ____.

Finding Subtraction Errors

Can you find the 10 errors in the following subtraction examples? Remember that it is counted an error if the answer is not expressed in simplest form.

$$\begin{array}{r} 1. \quad \frac{1}{4} = \frac{2}{8} \\ \frac{1}{8} = \frac{1}{8} \\ \hline \frac{1}{8} \end{array}$$

$$\begin{array}{r} 2. \quad 1 - \frac{5}{8} = \\ \frac{8}{8} - \frac{5}{8} = \frac{3}{8} \end{array}$$

$$\begin{array}{r} 3. \quad 8\frac{1}{3} = 8\frac{2}{6} = 7\frac{8}{6} \\ \frac{15}{6} = \frac{15}{6} = \frac{15}{6} \\ \hline 6\frac{3}{6} \end{array}$$

$$\begin{array}{r} 4. \quad \frac{1}{3} = \frac{4}{12} \\ \frac{1}{4} = \frac{3}{12} \\ \hline \frac{1}{12} \end{array}$$

$$\begin{array}{r} 5. \quad 3 - \frac{5}{6} = \\ 3\frac{6}{6} - \frac{5}{6} = 3\frac{1}{6} \end{array}$$

$$\begin{array}{r} 6. \quad 9\frac{1}{2} = 9\frac{4}{8} = 8\frac{12}{8} \\ \frac{27}{8} = \frac{27}{8} = \frac{27}{8} \\ \hline 7\frac{5}{8} \end{array}$$

$$\begin{array}{r} 7. \quad \frac{3}{10} = \frac{3}{10} \\ \frac{1}{5} = \frac{2}{10} \\ \hline \frac{1}{10} \end{array}$$

$$\begin{array}{r} 8. \quad 4\frac{3}{16} = 3\frac{19}{16} \\ 1\frac{3}{4} = \frac{1\frac{12}{16}}{2\frac{7}{16}} \end{array}$$

$$\begin{array}{r} 9. \quad 10\frac{3}{4} = 10\frac{9}{12} = 9\frac{21}{12} \\ \frac{55}{6} = \frac{5\frac{10}{12}}{14\frac{11}{12}} \end{array}$$

$$\begin{array}{r} 10. \quad 3\frac{7}{12} = 3\frac{7}{12} \\ 2\frac{1}{6} = \frac{2\frac{2}{12}}{1\frac{5}{12}} \end{array}$$

$$\begin{array}{r} 11. \quad 5\frac{4}{5} = 5\frac{8}{10} \\ 3\frac{1}{2} = \frac{3\frac{5}{10}}{2\frac{3}{10}} \end{array}$$

$$\begin{array}{r} 12. \quad 10 - \frac{9}{10} = \\ 9\frac{10}{10} - \frac{9}{10} = 9\frac{1}{10} \end{array}$$

$$\begin{array}{r} 13. \quad 4\frac{7}{8} = 4\frac{14}{16} \\ 2\frac{5}{16} = \frac{2\frac{5}{16}}{2\frac{8}{16}} = 2\frac{1}{2} \end{array}$$

$$\begin{array}{r} 14. \quad \frac{3}{8} = \frac{3}{8} \\ \frac{1}{4} = \frac{2}{8} \\ \hline \frac{5}{8} \end{array}$$

$$\begin{array}{r} 15. \quad 3\frac{5}{6} = 3\frac{10}{12} \\ 2\frac{1}{2} = \frac{2\frac{6}{12}}{1\frac{4}{12}} \end{array}$$

$$\begin{array}{r} 16. \quad 4\frac{3}{4} = 4\frac{9}{12} \\ 2\frac{5}{12} = \frac{2\frac{5}{12}}{2\frac{4}{12}} \end{array}$$

$$\begin{array}{r} 17. \quad 11 - \frac{7}{8} = \\ 10\frac{8}{8} - \frac{7}{8} = 10\frac{1}{8} \end{array}$$

$$\begin{array}{r} 18. \quad 3\frac{1}{4} = 3\frac{3}{12} = 2\frac{15}{12} \\ 2\frac{5}{6} = \frac{2\frac{10}{12}}{1\frac{5}{12}} \end{array}$$

$$\begin{array}{r} 19. \quad 7\frac{1}{5} = 7\frac{2}{10} = 7\frac{12}{10} \\ 2\frac{1}{2} = \frac{2\frac{5}{10}}{5\frac{7}{10}} \end{array}$$

$$\begin{array}{r} 20. \quad 14 - \frac{5}{6} = \\ 13\frac{6}{6} - \frac{5}{6} = 13\frac{1}{6} \end{array}$$

$$\begin{array}{r} 21. \quad 15 - \frac{4}{5} = \\ 15\frac{5}{5} - \frac{4}{5} = 15\frac{1}{5} \end{array}$$

Practice in Subtracting Fractions

EASY PRACTICE

1. $\frac{7}{8} - \frac{5}{8} =$
2. $\frac{3}{4} - \frac{1}{2} =$
3. $\frac{1}{3} - \frac{1}{4} =$
4. $\frac{1}{3} - \frac{1}{6} =$
5. $\frac{5}{16} - \frac{1}{4} =$
6. $3\frac{7}{12} - 1\frac{1}{4} =$
7. $5\frac{3}{4} - 2\frac{9}{16} =$
8. $9\frac{11}{12} - 2\frac{3}{4} =$
9. $\frac{9}{16} - \frac{3}{8} =$
10. $\frac{3}{4} - \frac{3}{8} =$

HARDER PRACTICE

1. $\frac{2}{3} - \frac{1}{2} =$
2. $\frac{5}{6} - \frac{1}{4} =$
3. $\frac{7}{8} - \frac{1}{2} =$
4. $\frac{3}{4} - \frac{2}{3} =$
5. $\frac{3}{8} - \frac{1}{16} =$
6. $8\frac{7}{12} - 2\frac{1}{4} =$
7. $10\frac{9}{16} - 7\frac{1}{8} =$
8. $9\frac{7}{12} - 3\frac{1}{3} =$
9. $\frac{3}{4} - \frac{1}{12} =$
10. $25\frac{7}{10} - 13\frac{3}{5} =$

STILL HARDER PRACTICE

1. $1 - \frac{2}{3} =$
2. $7 - \frac{5}{6} =$
3. $8 - \frac{3}{10} =$
4. $9 - \frac{4}{5} =$
5. $9 - 7\frac{3}{8} =$
6. $8\frac{1}{4} - 5\frac{7}{12} =$
7. $15\frac{2}{3} - 3\frac{5}{6} =$
8. $17\frac{1}{6} - \frac{3}{4} =$
9. $15\frac{1}{4} - 8\frac{2}{3} =$
10. $12\frac{1}{3} - 9\frac{3}{4} =$

PROBLEMS

1. Mrs. Burr has 8 yd. of silk. She needs $4\frac{3}{4}$ yd. for a dress. She told a friend that she would sell her the other ____ yd.

2. Tom weighed $82\frac{3}{4}$ lb. before he went to camp. After he returned he weighed $89\frac{1}{4}$ lb. He gained ____ lb. while he was at camp.

3. A freight agent was unloading boxes from a car, using a hand truck weighing $36\frac{3}{4}$ lb. He was recording the weight of each box. One box and the truck weighed $84\frac{1}{2}$ lb.; so he wrote down ____ lb. as the weight of that box.

4. A large truck can haul 2 tons; a small truck can haul $\frac{3}{4}$ ton. The large truck can haul ____ more pounds than the small truck.

Practice Exercises

How many of these examples can you do correctly in 20 minutes?
Work as carefully as you can.

$$\begin{array}{r} 1. \quad 25.8 \\ 46.9 \\ 73.4 \\ 86.7 \\ 99.8 \\ \hline 27.6 \end{array}$$

$$\begin{array}{r} 2. \quad 547 \\ \times 80 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 27.8 \\ - 19.75 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 17932 \\ - 9658 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 7.06 \\ \times 395 \\ \hline \end{array}$$

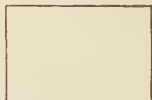
$$6. \quad 72 \overline{)144216}$$

$$\begin{array}{r} 7. \quad 1754 \\ \times .09 \\ \hline \end{array}$$

$$8. \quad 1000 \times 2.456 \quad 9. \quad 10 \times 75.83$$

10. Find in square feet the area of a board $6'' \times 10'$.
(HINT. Are the dimensions both given in feet?)

11. This is the floor plan of a school gymnasium. The scale used in drawing it is $\frac{1}{4}$ in. to 25 ft. With the aid of your ruler can you find out the length and the width of the floor?



12. Find the area of this gymnasium floor.

$$\begin{array}{r} 13. \quad 3\frac{9}{12} \\ + 4\frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 14. \quad 4\frac{4}{5} \\ + \frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 15. \quad 9\frac{2}{3} \\ - \frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 16. \quad 10 \\ - 3\frac{1}{7} \\ \hline \end{array}$$

17. Miss Bright, a teacher, gets a salary of \$150 a month. She is paid for the 10 months of school; so during the year she receives _____ dollars. This is the same as _____ a month for 12 months.

18. Dick's father gives him 25¢ a week for spending money. In a year that amounts to _____.

19. Margaret said: "Newton is $5\frac{3}{4}$ miles north of our camp, and Andover is $6\frac{1}{2}$ miles north of Newton; so it must be _____ miles from our camp to Andover. The trip there and back is _____ miles."

20. If wafers sell for 40¢ a pound, for 1¢ I should get $\frac{1}{40}$ of a pound; so for 5¢ I should get _____ of a pound.

Multiplying and Dividing Fractions

1. $\boxed{\frac{1}{2} \times \frac{3}{4}}$ In doing this multiplication think: $1 \times 3 = ?$; $2 \times 4 = ?$; the answer is a fraction whose numerator is ____ and whose denominator is ____.

2. $\boxed{\frac{1}{3} \div \frac{3}{4}}$ In doing this example first invert the $\frac{3}{4}$ and change the $\div$ to a $\times$. Then the example looks like this: $\boxed{\frac{1}{3} \times \frac{4}{3}}$ Think: The numerator of the answer is 1 times 4, or ____; the denominator is 3 times 3, or ____.

3. Teddy multiplied $\frac{2}{3}$ by $\frac{5}{6}$ this way: $\frac{2}{3} \times \frac{5}{6} = \frac{10}{18} = \frac{5}{9}$.

Mary did it this way: $\frac{\frac{1}{2}}{3} \times \frac{\frac{5}{6}}{3} = \frac{5}{9}$.

Did they both get the same answer? Can you explain the difference in their work? Mary's way is better than Teddy's way because it gives smaller numbers with which to work.

4. $\boxed{\frac{2}{3} \div \frac{5}{6}}$ When the first step in this example has been done, it looks like this: $\boxed{\frac{2}{3} \times \frac{6}{5}}$. Explain the step that has been done and then work the example as Mary worked Example 3.

5. $\boxed{1\frac{2}{3} \times \frac{2}{5}}$ When the first step in this example has been done, it looks this way: $\boxed{\frac{5}{3} \times \frac{2}{5}}$. Explain the step that has been done and then finish the example.

6. $\boxed{2\frac{2}{3} \div \frac{4}{5}}$ When the first two steps in this example have been done, it looks like this: $\boxed{\frac{8}{3} \times \frac{5}{4}}$. Explain the steps that have been done and then finish the example.

Finding Errors

There are 10 wrong answers in the multiplication and division examples in Ethel's paper. Can you find them? All answers not expressed in simplest form are counted wrong.

Arithmetic

Ethel Bennett

Sixth Grade

$$\textcircled{1} \quad \frac{2}{3} \times \frac{5}{7} = \frac{10}{21}$$

$$\textcircled{2} \quad \frac{\cancel{2}^1}{\cancel{4}_1} \times \frac{\cancel{8}^2}{\cancel{4}_3} = \frac{2}{3}$$

$$\textcircled{3} \quad \frac{\cancel{6}^2}{\cancel{3}_1} \div \frac{\cancel{12}^2}{\cancel{18}_5} = \frac{4}{5}$$

$$\textcircled{4} \quad \frac{5}{6} \div \frac{2}{3} = \frac{5}{6} \times \frac{3}{2} = \frac{5}{4}$$

$$\textcircled{5} \quad 8 \div \frac{4}{5} = \cancel{8} \times \frac{5}{\cancel{4}_1} = 10$$

$$\textcircled{6} \quad \cancel{8}^2 \times \frac{3}{\cancel{4}_1} = 6$$

$$\textcircled{7} \quad 7 \times \frac{3}{4} = \frac{21}{4} = 5\frac{1}{4}$$

$$\textcircled{8} \quad \frac{\cancel{2}^1}{\cancel{8}_1} \times \frac{\cancel{4}^1}{\cancel{8}_4} = \frac{1}{4}$$

$$\textcircled{9} \quad \frac{3}{2} \div 9 = \frac{1}{2} \times \frac{1}{9} = \frac{1}{6}$$

$$\textcircled{10} \quad \frac{3}{8} \div \frac{3}{4} = \frac{\cancel{3}^1}{\cancel{8}_2} \times \frac{\cancel{4}^1}{\cancel{3}_1} = 2$$

$$\textcircled{11} \quad \frac{8}{9} \times 10 = \frac{80}{9}$$

$$\textcircled{12} \quad \frac{6}{7} \times \frac{2}{9} = \frac{12}{63}$$

$$\textcircled{13} \quad \frac{5}{6} \times \cancel{12}^2 = 10$$

$$\textcircled{14} \quad \frac{7}{8} \div \frac{14}{15} = \frac{\cancel{7}^1}{\cancel{8}_2} \times \frac{15}{\cancel{14}_7} = \frac{15}{16}$$

$$\textcircled{15} \quad 1\frac{5}{6} \times \frac{3}{4} = \frac{11}{6} \times \frac{\cancel{3}^1}{\cancel{4}_2} = \frac{11}{8} = 1\frac{3}{8}$$

$$\textcircled{16} \quad \frac{\cancel{2}^1}{\cancel{2}_1} \times \frac{\cancel{2}^1}{\cancel{2}_1} = 1$$

$$\textcircled{17} \quad 2\frac{7}{9} \div \frac{5}{6} = \frac{\cancel{25}^5}{\cancel{9}_3} \times \frac{\cancel{6}^2}{\cancel{5}_1} = \frac{10}{3} = 3\frac{1}{3}$$

$$\textcircled{18} \quad \frac{5}{8} \times 1\frac{2}{3} = \frac{5}{8} \times \frac{5}{3} = \frac{25}{24}$$

$$\textcircled{19} \quad \frac{6}{7} \div 1\frac{2}{3} = \frac{6}{7} \times \frac{5}{\cancel{3}_1} = \frac{10}{7} = 1\frac{3}{7}$$

$$\textcircled{20} \quad \frac{8}{9} \div \frac{8}{9} = \frac{\cancel{8}^1}{\cancel{9}_1} \times \frac{\cancel{9}^1}{\cancel{8}_1} = 0$$

$$\textcircled{21} \quad 1\frac{3}{4} \times 1\frac{1}{7} = \frac{\cancel{7}^1}{\cancel{4}_1} \times \frac{\cancel{8}^2}{\cancel{7}_1} = 2$$

$$\textcircled{22} \quad 3\frac{1}{3} \div 2\frac{3}{5} = \frac{\cancel{10}^2}{\cancel{3}_5} \times \frac{\cancel{13}^1}{\cancel{5}_1} = \frac{26}{3} = 8\frac{2}{3}$$

$$\textcircled{23} \quad \frac{7}{9} \div \frac{7}{9} = \frac{\cancel{7}^1}{\cancel{9}_1} \times \frac{\cancel{9}^1}{\cancel{7}_1} = 0$$

Fractions and Mixed Numbers in Multiplication and Division

Do these multiplications and divisions as carefully as you can:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $\frac{2}{3} \times \frac{3}{5}$	$\frac{5}{6} \div 3$	$1\frac{7}{8} \times \frac{4}{5}$	$8 \times \frac{3}{16}$
2. $\frac{7}{8} \times \frac{4}{5}$	$\frac{7}{9} \div \frac{7}{9}$	$9 \div \frac{3}{5}$	$10 \div 1\frac{2}{3}$
3. $\frac{3}{8} \times \frac{8}{3}$	$8 \div \frac{4}{5}$	$2\frac{1}{2} \div 1\frac{2}{3}$	$3\frac{1}{2} \times \frac{4}{5}$
4. $\frac{7}{9} \times \frac{3}{4}$	$1\frac{2}{3} \div 5$	$4\frac{1}{3} \div \frac{4}{5}$	$2\frac{3}{4} \div \frac{1}{5}$
5. $\frac{5}{6} \div \frac{1}{3}$	$1\frac{2}{3} \div \frac{1}{5}$	$3\frac{1}{3} \times \frac{3}{5}$	$\frac{5}{7} \div \frac{7}{10}$
6. $\frac{3}{10} \div \frac{3}{5}$	$1\frac{5}{6} \times \frac{3}{11}$	$5\frac{1}{3} \times \frac{3}{4}$	$\frac{5}{7} \div \frac{1}{2}$
7. $\frac{5}{16} \div \frac{3}{8}$	$2\frac{2}{3} \times 6$	$\frac{5}{6} \times \frac{4}{7}$	$1\frac{1}{2} \div 1\frac{1}{2}$
8. $4 \times \frac{3}{4}$	$10 \times 3\frac{1}{5}$	$21 \div \frac{3}{7}$	$8 \div \frac{1}{2}$
9. $5 \times \frac{2}{3}$	$12 \div 2\frac{2}{3}$	$2 \div \frac{1}{2}$	$12 \div \frac{1}{3}$
10. $7 \div \frac{4}{5}$	$15 \div 1\frac{1}{4}$	$\frac{1}{2} \div 2$	$24 \div \frac{1}{2}$

11. A cake recipe that Marie was using called for $\frac{3}{4}$ cup of butter. Since Marie was taking only $\frac{1}{2}$ the amounts called for, she used only ____ of a cup of butter.

12. Ruth had 6 yd. of tinsel. She wanted to divide it into short strips to hang on her Christmas tree. She said: "If I divide it into strips $\frac{1}{4}$ yd. long, I'll have ____ of them; if I divide it into strips $\frac{3}{8}$ yd. long, I'll have ____ of them; but if I divide it into strips $\frac{1}{2}$ yd. long, I'll have only ____ of them."

13. Mr. Myers owns 4 acres of land. If he divides it into building lots containing $\frac{1}{2}$ acre each, he will have ____ lots; if he divides it into building lots containing $\frac{1}{4}$ acre each, he will have ____ lots; if he divides it into lots containing $\frac{4}{5}$ acre each, he will have ____ lots.

14. There was $\frac{3}{4}$ of a cake in the cupboard. Mrs. Frank told George he might have $\frac{2}{3}$ of it for a picnic. That meant George was allowed to take ____ of a cake.

Selling Dress Goods

(1) Miss Brown sells dress goods at Martin's department store. When she sold $\frac{3}{4}$ yard of crêpe de chine today at \$2.95 a yard,

$\begin{array}{r} \frac{3}{4} \times \$2.95 = 4 \overline{)8.85} \\ \$2.21\frac{1}{4} \end{array}$
--

this is what she wrote down to find out what to charge for it. Can you explain her work?

$\begin{array}{r} \$ 2.95 \\ \quad 3\frac{3}{4} \\ \hline 885 \\ 221\frac{1}{4} \\ \hline \$11.06\frac{1}{4} \end{array}$

(2) When she sold $3\frac{3}{4}$ yards of the same material, this is what she wrote to find out what to charge for it. Where does the 885 come from? the $221\frac{1}{4}$?

Of course she charged only \$11.06. Why?

Show what she wrote to find out what to charge when she made the following sales:

1. $2\frac{1}{2}$ yd. of satin at \$4.00 a yard
2. $3\frac{1}{4}$ yd. of taffeta at \$3.00 a yard
3. $4\frac{3}{4}$ yd. of serge at \$6.00 a yard
4. $4\frac{1}{8}$ yd. of flannel at \$2.00 a yard
5. $3\frac{7}{8}$ yd. of jersey at \$2.00 a yard
6. $5\frac{1}{8}$ yd. of velvet at \$5.00 a yard
7. $3\frac{5}{8}$ yd. of crêpe at \$2.50 a yard
8. $4\frac{3}{4}$ yd. of velour at \$2.95 a yard
9. $4\frac{5}{8}$ yd. of georgette at \$2.49 a yard
10. $5\frac{7}{8}$ yd. of coat lining at \$.98 a yard
11. $3\frac{3}{4}$ yd. of crêpe de chine at \$4.95 a yard
12. $2\frac{1}{6}$ yd. of velvet at \$10.00 a yard
13. $5\frac{3}{8}$ yd. of tub silk at \$2.39 a yard

A Written Review

Add:

$$\begin{array}{r} 1. \ 456.83 \\ 295.47 \\ 867.63 \\ 54.90 \\ 87.09 \\ \hline 290.00 \end{array}$$

$$\begin{array}{r} 2. \ \frac{3}{8} \\ \frac{1}{2} \\ \frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 3. \ 4\frac{5}{16} \\ 2\frac{1}{4} \\ 5\frac{5}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 4. \ 5\frac{1}{2} \\ 2\frac{7}{8} \\ \hline \end{array}$$

5. Find the sum of $\frac{1}{4}$, $\frac{5}{6}$, and $\frac{1}{3}$.

Subtract:

$$\begin{array}{r} 6. \ 248.74 \\ 29.87 \\ \hline \end{array}$$

$$7. \ 1 - \frac{7}{8}$$

$$\begin{array}{r} 8. \ 5\frac{9}{16} \\ 3\frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 9. \ 8\frac{1}{3} \\ 1\frac{5}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 10. \ 10\frac{3}{4} \\ 5\frac{5}{6} \\ \hline \end{array}$$

Multiply:

$$\begin{array}{r} 11. \ 4\ 5.6\ 7 \\ 2\ 4.9 \\ \hline \end{array}$$

$$12. \ \frac{3}{2} \times \frac{1}{9}$$

$$13. \ \frac{2}{7} \times \frac{7}{8}$$

$$14. \ \frac{15}{16} \times \frac{3}{4}$$

$$15. \ \frac{3}{4} \times \frac{4}{3}$$

Divide:

$$16. \ 416 \overline{)148512}$$

$$17. \ \frac{7}{8} \div \frac{14}{15}$$

$$18. \ 2\frac{7}{8} \div \frac{5}{6}$$

$$19. \ \frac{6}{7} \div 1\frac{2}{3}$$

20. Find the total cost of the following groceries:

10 pounds of sugar at $7\frac{1}{2}\text{¢}$ a pound.

9 eggs at 48¢ a dozen.

15 pounds of potatoes at $3\frac{1}{2}\text{¢}$ a pound.

21. If paper napkins sell at a rate of 25¢ a hundred, what is the cost of 500 napkins?

22. The Jones family pays \$42 a month for rent. If Mr. Jones's yearly income is \$2300 and he saves $\frac{1}{10}$ of it, how much is he able to spend during the year for other things?

23. If Donald buys 6 dozen lead pencils at 40¢ a dozen and sells them at 5¢ each, how much will he make?

24. Find the cost of $4\frac{3}{4}$ yards of silk at \$2.98 a yard.

Progress Test No. 1

Write only the answers to these examples on your paper. Number each answer. You may use scratch paper if you need to. (Record your score in the Progress Test Record at the back of the book.)

$$\begin{array}{r} 1. \quad 254 \\ \times 2.65 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 49.86 \\ - 2.987 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 298.79 \\ 49.86 \\ 9.567 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad \frac{3}{8} \\ + \frac{5}{16} \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 13\frac{5}{8} \\ \frac{3}{4} \\ 9\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad \frac{5}{12} \\ \frac{2}{3} \\ \frac{5}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 89.74 \\ 9.298 \\ \hline \end{array}$$

$$7. \quad 9 - 7\frac{3}{8}$$

$$8. \quad 15\frac{2}{3} - 8\frac{5}{8}$$

$$9. \quad \frac{6}{7} \times \frac{2}{9}$$

$$10. \quad 3\frac{1}{3} \div 2\frac{3}{5}$$

$$11. \quad \frac{7}{8} \times \frac{8}{7}$$

$$12. \quad 7\frac{1}{3} \div 11$$

13. A lot is 56 ft. wide and 150 ft. long. How many feet of wire fencing are needed to enclose it?

14. A farmer raised 100 bu. of potatoes. He kept $\frac{1}{4}$ of them for the use of his family and sold the others for \$1.15 a bushel. How much did he receive for them?

15. David rode from Claremont to Harmon, a distance of 39 miles, in 6 hours. Harry rode from Claremont to Kingsford, a distance of 48 miles, in 8 hours. Each boy claims that he traveled faster than the other. Which one is right?

16. If apples are selling at 6 for a quarter, how many apples can you get for a half dollar?

17. On James's report card he has 80 in History, 85 in Drawing, 90 in Arithmetic, and 85 in Spelling. What is his average mark?

Standards : X, 15. Y, 12. Z, 8.

CHAPTER II

DECIMALS IN DIVISION

Reasonable Answers

(1) Does this answer look reasonable? —————→
 If the answer is right, we know that $21 \times 9.4 = 197.4$.
 Do you think it does? 21 is about 20. 9.4 is about 10. $20 \times 10 = 200$. Is 197.4 about 200? If so, then 9.4 is a reasonable answer.

$$\begin{array}{r} 9.4 \\ 21 \overline{)197.4} \\ \underline{189} \\ 84 \\ \underline{84} \\ 0 \end{array}$$

(2) Karl did this division example: —————→
 Is his answer reasonable? 39×21 should equal 81.9. $40 \times 20 = 800$. Is 81.9 about 800? If not, then 21 is not a reasonable answer. What is the matter?

$$\begin{array}{r} 21 \\ 39 \overline{)81.9} \\ \underline{78} \\ 39 \\ \underline{39} \\ 0 \end{array}$$

(3) Albert did this division example: —————→
 Does his answer look reasonable? $38 \times .51$ should equal 19.38. 38 is about 40. .51 is about $\frac{1}{2}$. $40 \times \frac{1}{2} = 20$. Is 19.38 about 20? Then is the answer reasonable?

$$\begin{array}{r} .51 \\ 38 \overline{)19.38} \\ \underline{190} \\ 38 \\ \underline{38} \\ 0 \end{array}$$

When you divide a decimal by a whole number, you put the decimal point in the quotient right above or below the decimal point in the dividend.

(4) In which examples above was the rule followed? In which were the answers reasonable?

Are the answers to these examples reasonable?

1.	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>
	$5 \overline{)224.5}$	$6 \overline{)30.66}$	$7 \overline{)42.77}$	$8 \overline{)49.6}$	$9 \overline{)288.9}$	$9 \overline{)46.89}$
	44.9	5.11	61.1	6.2	3.21	.521

Decimals in Division

Tell where the decimal point should be placed in each of these quotients. Then read the answers correctly.

$$\begin{array}{r} 1. \quad 8 \overline{)25.6} \\ \underline{32} \end{array}$$

$$\begin{array}{r} 9 \overline{)55.89} \\ \underline{621} \end{array}$$

$$\begin{array}{r} 7 \overline{)5.894} \\ \underline{842} \end{array}$$

$$\begin{array}{r} 2. \quad 6 \overline{)50.64} \\ \underline{844} \end{array}$$

$$\begin{array}{r} 5 \overline{)488.0} \\ \underline{976} \end{array}$$

$$\begin{array}{r} 3 \overline{).9879} \\ \underline{3293} \end{array}$$

$$\begin{array}{r} 51 \\ 3. \quad 39 \overline{)19.89} \end{array}$$

$$\begin{array}{r} 71 \\ 42 \overline{)298.2} \end{array}$$

$$\begin{array}{r} 20 \\ 56 \overline{)11.20} \end{array}$$

$$\begin{array}{r} 125 \\ 4. \quad 39 \overline{)4.875} \end{array}$$

$$\begin{array}{r} 243 \\ 76 \overline{)184.68} \end{array}$$

$$\begin{array}{r} 195 \\ 47 \overline{)91.65} \end{array}$$

Do the divisions below. Be careful to “point off” (place the decimal point) correctly.

$$\begin{array}{r} a \\ 5. \quad 9 \overline{)20.79} \end{array}$$

$$\begin{array}{r} b \\ 8 \overline{)34.24} \end{array}$$

$$\begin{array}{r} c \\ 7 \overline{)5.971} \end{array}$$

$$\begin{array}{r} d \\ 6 \overline{)56.04} \end{array}$$

$$\begin{array}{r} e \\ 5 \overline{)4.795} \end{array}$$

$$6. \quad 57 \overline{)18.24}$$

$$95 \overline{)35.15}$$

$$48 \overline{)460.8}$$

$$23 \overline{)20.47}$$

$$76 \overline{)288.8}$$

$$7. \quad 46 \overline{)6.670}$$

$$35 \overline{)9.660}$$

$$79 \overline{)2725.5}$$

$$86 \overline{)420.54}$$

$$43 \overline{)88.15}$$

(1) In all the examples above the divisors were whole numbers. Here is one in which the divisor is a decimal. Which answer do you think is pointed off correctly? Why?

$\begin{array}{r} a. \quad 36 \\ 7.2 \overline{)25.92} \\ \underline{216} \\ 432 \\ \underline{432} \end{array}$	$\begin{array}{r} b. \quad 3.6 \\ 7.2 \overline{)25.92} \\ \underline{216} \\ 432 \\ \underline{432} \end{array}$
---	--

(2) Marie says that she thinks the second one is correct because a number a little larger than 25 divided by a number a little larger than 7 gives a quotient of about 3. Is she right?

On the next page you will learn an easy way to divide a decimal by a decimal.

Decimals in Division

1. In this division example the divisor is a decimal. It will be easy to do if you change the divisor to a whole number.

$$7.5 \overline{)20.25}$$

(1) Move the decimal point in the divisor one place to the right and cross out the old one like this: $\longrightarrow$

$$7.\overline{5} \overline{)20.25}$$

(2) Move the decimal point in the dividend also one place to the right and cross out the old one like this: $\longrightarrow$

$$7.\overline{5} \overline{)202.5}$$

(3) Put the decimal point in the quotient right above the new decimal point in the dividend.

$$\begin{array}{r} 2.7 \\ 7.\overline{5} \overline{)202.5} \\ \underline{150} \\ 525 \\ \underline{525} \\ 0 \end{array}$$

(4) Go ahead and divide. The answer is 2.7.

(5) Is it reasonable? 7.5 is about 7. 2.7 is about _____. $7 \times 3 = \underline{\hspace{1cm}}$. Is 20.25 about 21? If so, then the answer is reasonable.

2. Can you divide 1.152 by .48?

(1) Make the divisor a whole number.

(2) Move the decimal point the *same* number of places to the right in the dividend.

$$.48 \overline{)1.152}$$

(3) Put the decimal point in the quotient.

(4) Divide. Is the answer reasonable?

$$\begin{array}{r} 2.4 \\ .48 \overline{)115.2} \\ \underline{96} \\ 192 \\ \underline{192} \\ 0 \end{array}$$

3. Can you divide 7.4 by .037?

(1) Make the divisor a whole number.

(2) Move the decimal point the same number of places to the right in the dividend. (Put in enough zeros so that you can do it.)

$$.037 \overline{)7400.}$$

(3) Put the decimal point in the quotient.

(4) Divide. Is the answer 200? Is it reasonable? (Check by seeing if $200 \times .037 = 7.4$.)

$$\begin{array}{r} 200. \\ .037 \overline{)7400.} \\ \underline{7400} \\ 0 \end{array}$$

Decimals in Division

Here are the rules for dividing by a decimal :

(1) *Make the divisor a whole number by moving the decimal point to the end of the number.*

(2) *Move the decimal point in the dividend as many places to the right as you moved the point in the divisor.*

(3) *Put a decimal point for the quotient above the new decimal point in the dividend,*

(4) *Divide as you do with whole numbers.*

In the *B* columns you will find the examples of the *A* columns with the decimal points placed where they will be in the quotient. There is one point placed incorrectly. Can you find it?

<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>
1. $5.2 \overline{)435.7}$	$5.2 \overline{)435.7\dot{}}$	4. $.73 \overline{)2986}$	$.73 \overline{)29.86\dot{}}$
2. $.29 \overline{)15.7}$	$.29 \overline{)15.70\dot{}}$	5. $.076 \overline{)4.739}$	$.076 \overline{)4.739\dot{}}$
3. $.043 \overline{)35}$	$.043 \overline{)35.000\dot{}}$	6. $.75 \overline{)36.79}$	$.75 \overline{)36.79\dot{}}$

Do not do these divisions. Just copy the examples and place the decimal points where they would be in the quotients.

7. $72 \overline{)54.68}$	12. $.298 \overline{)3872}$	17. $3.2 \overline{)32}$
8. $2.5 \overline{)4.638}$	13. $75.9 \overline{)39.86}$	18. $.32 \overline{)3.2}$
9. $.27 \overline{)361.8}$	14. $.005 \overline{)2.79}$	19. $3.2 \overline{)3.2}$
10. $35 \overline{)678.3}$	15. $.5 \overline{)43987}$	20. $.32 \overline{)32}$
11. $735 \overline{)7986}$	16. $.72 \overline{)386}$	21. $.032 \overline{)3.2}$

Practice in Division by Decimals

Do these divisions, using the rules on page 226:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $.9 \overline{)81.72}$	$.08 \overline{)2.584}$	$.07 \overline{)52.85}$	$.9 \overline{)65.70}$
2. $.006 \overline{)3.654}$	$.008 \overline{)4.544}$	$.003 \overline{)97.38}$	$.005 \overline{)678.5}$
3. $.004 \overline{)1696}$	$.4 \overline{)2.988}$	$7 \overline{)546.7}$	$8 \overline{)69.76}$
4. $9 \overline{)8.469}$	$.6 \overline{).5472}$	$.08 \overline{).01624}$	$.09 \overline{)276.3}$
5. $.905 \overline{)2986.5}$	$3.2 \overline{)1.888}$	$.102 \overline{)4.998}$	$.39 \overline{)79.95}$
6. $87 \overline{)25.23}$	$.026 \overline{).01898}$	$.063 \overline{)2.205}$	$.15 \overline{)2.685}$
7. $.039 \overline{)28.197}$	$5.30 \overline{)20.670}$	$.52 \overline{)164.32}$	$.027 \overline{)2916}$

Is the decimal point correctly placed in the quotient in this example? Is the answer .52? (Does $2 \times .52 = .104$?) (Does $2 \times .052 = .104$?)

2).104
. 52

When there is a space between the decimal point and the first figure of the quotient, put a zero in the space like this:

2).104
.052

If there are two spaces, put in two zeros like this:

2).0168
.0084

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
8. $.7 \overline{)4.9}$	$.6 \overline{)84}$	$.7 \overline{).49}$	$.06 \overline{).84}$	$7 \overline{)3.5}$
9. $7 \overline{).35}$	$.09 \overline{).81}$	$.08 \overline{)1.28}$	$.8 \overline{)5.6}$	$.08 \overline{).72}$
10. $9 \overline{).63}$	$.03 \overline{).27}$	$9 \overline{).45}$	$9 \overline{)3.6}$	$.7 \overline{).0126}$
11. $.07 \overline{)11.2}$	$8 \overline{).56}$	$.04 \overline{)12.4}$	$6 \overline{)72}$	$.09 \overline{).0144}$
12. $.5 \overline{).65}$	$8 \overline{)6.4}$	$7 \overline{).49}$	$.8 \overline{).0144}$	$9 \overline{)27}$
13. $.6 \overline{)5.4}$	$.06 \overline{)12.6}$	$.9 \overline{)1.17}$	$6 \overline{).54}$	$.05 \overline{)12.5}$
14. $.4 \overline{).04}$	$.4 \overline{).004}$	$.4 \overline{)4}$	$.04 \overline{)4}$	$.04 \overline{).4}$
15. $.1 \overline{)10}$	$.01 \overline{).1}$	$.01 \overline{)10}$	$.01 \overline{).01}$	$.1 \overline{)1}$

Checking Division

(1) In the fourth grade you learned that to check a division example you should multiply the ____ by the ____ to see if the product equals the ____.

$\begin{array}{r} \text{Example: } 8 \overline{)728} \\ 91 \end{array}$	$\text{Check: } 8 \times 91 = 728$
---	------------------------------------

(2) Division examples containing decimals are checked in the same way.

$\begin{array}{r} \text{Example: } .9 \overline{)72.54} \\ 80.6 \end{array}$	$\begin{array}{rcl} \text{Check: } 80.6 & \text{Quotient} \\ .9 & \text{Divisor} \\ \hline 72.54 & \text{Dividend} \end{array}$
--	---

Work the following examples, checking each answer:

- | a | b | c | d | e |
|-----------------------------|---------------------------|-------------------------|--------------------------|--------------------------|
| 1. $.073 \overline{)1.898}$ | $.15 \overline{)268.5}$ | $.83 \overline{)5.229}$ | $.108 \overline{)29.16}$ | $316 \overline{)16.432}$ |
| 2. $39 \overline{)2.0670}$ | $.39 \overline{)2.8197}$ | $5.9 \overline{)18.88}$ | $6.7 \overline{)3.618}$ | $49 \overline{)49.98}$ |
| 3. $205 \overline{)7.995}$ | $7.23 \overline{).28197}$ | $83 \overline{)104.58}$ | $.89 \overline{)18.69}$ | $8.7 \overline{)2.523}$ |
| 4. $.063 \overline{)2.205}$ | $36 \overline{)61.2}$ | $53 \overline{).1696}$ | $.63 \overline{).2268}$ | $.94 \overline{).03008}$ |

5. Saving \$1.50 a week, it would take you ____ weeks to save \$30.00.

6. A salesman traveled 125.9 miles the first day of a trip, 137.4 miles the second day, 119.8 miles the third day, and 147.6 miles the fourth day. He said, "I averaged ____ miles a day on that trip."

7. A farmer sold 27.45 acres of land for \$2058.75. That was an average of ____ dollars an acre.

Summing Up Division

1. $\begin{array}{r} 5 \overline{)8762} \\ 1752\frac{2}{5} \end{array}$ In this example 5 is the ____, 8762 is the ____, and $1752\frac{2}{5}$ is the ____.

2. In checking a division example multiply the ____ by the _____. The product should equal the ____.

3. $75 \overline{)150225}$

4. $67 \overline{)209040}$

5. $963 \overline{)23112}$

6. $\frac{2}{3} \div \frac{6}{11} =$

7. $1\frac{2}{3} \div \frac{4}{5} =$

8. $5 \div \frac{5}{6} =$

9. $\frac{5}{9} \div 10 =$

10. $3\frac{1}{2} \div 2\frac{1}{3} =$

11. $\frac{8}{9} \div \frac{8}{9} =$

12. $9 \overline{)21050}$

13. $7 \overline{)4306}$

14. The first step in doing a division example which has a decimal divisor is to change the ____ to a whole number by moving the ____ ____ to the end of the divisor.

15. The second step is to move the decimal point of the ____ as many places to the ____ as the decimal point of the ____ was moved.

16. The decimal point in the quotient should be written above the new decimal point of the ____.

17. To find $\frac{1}{5}$ of a number, ____ the number by ____.

Tell where you would put the decimal point in each of these divisions:

18. $\begin{array}{r} a \\ 7 \overline{)35.49} \\ 507 \end{array}$

$\begin{array}{r} b \\ .8 \overline{)4.056} \\ 507 \end{array}$

$\begin{array}{r} c \\ .9 \overline{)56.7} \\ 63 \end{array}$

$\begin{array}{r} d \\ 6 \overline{)56.52} \\ 942 \end{array}$

19. $\begin{array}{r} 34 \\ 4.6 \overline{)15.64} \end{array}$

$\begin{array}{r} 73 \\ 6.8 \overline{)49.64} \end{array}$

$\begin{array}{r} 73 \\ .21 \overline{)153.3} \end{array}$

$\begin{array}{r} 49 \\ 63 \overline{)308.7} \end{array}$

20. $\begin{array}{r} 38 \\ 5.1 \overline{)19.38} \end{array}$

$\begin{array}{r} 99 \\ .46 \overline{)45.54} \end{array}$

$\begin{array}{r} 58 \\ 2.6 \overline{)150.8} \end{array}$

$\begin{array}{r} 73 \\ .29 \overline{)211.7} \end{array}$

A Page of Review

1. Find the sum of 35.79, 86.32, 49.87, 65.00, 3.27, and 4.98.
2. Find the difference between 25.79 and 29.87.
3. Find the sum of eight and three fourths, and ten and five sixths.

4. Eighteen less three fifths is ____.

5. Find the product of 5.08 and 2.567.

6. Write in figures: six thousand six and six thousand sixty-six ten thousandths.

$$\begin{array}{r} 7. \quad \frac{5}{6} \\ \frac{3}{4} \\ \frac{1}{2} \end{array}$$

$$8. \quad \begin{array}{r} 3\frac{1}{3} \\ - 2\frac{5}{6} \end{array}$$

$$9. \quad \begin{array}{r} 3\frac{2}{3} \\ 1\frac{5}{6} \\ 3\frac{3}{4} \end{array}$$

$$10. \quad 5\frac{1}{10} - 2\frac{3}{5} =$$

$$11. \quad 6\frac{1}{2} + 3\frac{7}{8} + 1\frac{1}{4} =$$

$$12. \quad 1\frac{5}{7} \times \frac{3}{4} =$$

$$13. \quad \frac{8}{9} \times \frac{3}{4} =$$

$$14. \quad 1\frac{1}{2} \div \frac{2}{3} =$$

$$15. \quad 8\frac{3}{8} - 2\frac{5}{16} =$$

$$16. \quad 4\frac{1}{2} \times 2\frac{1}{3} =$$

$$17. \quad 9 \times 2\frac{2}{3} =$$

$$18. \quad 9.62 \div 2.6$$

$$20. \quad .480 \div 15$$

$$19. \quad 76.8 \div 1.6$$

$$21. \quad 179.2 \div .28$$

22. If you divide \$17.75 equally among 5 persons, each person will get ____.

23. The O'Briens paid \$36.00 a month for rent. They are moving into a larger house this week, and their rent will be \$42.50 a month. They will be paying ____ more a year for rent for the new house than they paid for the old one.

24. Mrs. James bought a ham weighing $10\frac{1}{4}$ lb. She weighed what was left of it yesterday and found that it weighed only $5\frac{3}{8}$ lb. She said, "I've used ____ lb. of the ham."

25. We drove from Hamilton to Dayton, a distance of 29.25 mi., in 45 min. Did we average more or less than a mile a minute? Our average speed was ____ of a mile a minute.

Expressing Remainders *

1. If you were finding how to divide 153 sandwiches among 28 boys, at a picnic, would you express the remainder as a fraction?

	5 r 13
28	$\overline{)153}$
	140
	$\underline{13}$

2. If you were finding how to divide 19 yd. of ribbon equally among 6 girls, would you express the remainder as a fraction?

3. Would you express the remainder as a fraction if you were :

- a. dividing 7 little cakes equally among 3 children?
- b. dividing 26 marbles among 5 boys?
- c. dividing a city block 350 ft. long into 8 lots of equal width?
- d. dividing 101 chickens among 10 chicken yards?
- e. dividing 25 yd. of silk into 6 equal pieces?
- f. dividing 25 rabbits among 4 children?
- g. dividing 49 ft. of rope into 12 equal parts?
- h. dividing 300 children to ride in 8 busses?
- i. dividing 35 acres into 6 equal lots?
- j. dividing 9 pt. of milk among 6 people?
- k. dividing 12 dolls among 5 girls?

You see that it depends upon the problem whether or not the remainder in a division example should be expressed as a fraction. Before you write a remainder as a fraction, always be sure that it is reasonable to do so.

How would you express the remainders in these problems?

4. When oranges are selling for 6¢ each, how many oranges can you buy for a quarter?

5. Five boys were playing ball. By accident the ball went through a neighbor's windowpane. It cost \$1.97 to have the glass replaced. The boys wished to share the cost equally. How much should each boy pay?

* NOTE TO THE TEACHER. See last paragraph of Preface.

Remainders Expressed as Decimals

(1) Some children in the fourth grade had this division example: $6 \overline{)2145}$. They did it this way:

$$\begin{array}{r} 6 \overline{)2145} \\ 357 \frac{3}{6} \end{array}$$

(2) Some fifth-grade children did it this way:

$$\begin{array}{r} 6 \overline{)2145} \\ 357 \frac{1}{2} \end{array}$$

(3) Some sixth-grade children expressed the remainder as a decimal like this:

$$\begin{array}{r} 6 \overline{)2145.0} \\ 357.5 \end{array}$$

(4) Is 2145.0 the same as 2145?

When you see that a division example will have a remainder, you can place a decimal point after the dividend, annex zeros, and go on dividing. Annexing zeros after the decimal point does not change the value of a number. ($5.00 = 5 \frac{0}{10} \frac{0}{10} = 5$)

1. Study these examples and then see if you can do them without looking at the book:

a. $104 \div 32 =$

$$\begin{array}{r} 3.25 \\ 32 \overline{)104.00} \\ \underline{96} \\ 80 \\ \underline{64} \\ 160 \\ \underline{160} \end{array}$$

b. $216 \div 48 =$

$$\begin{array}{r} 4.5 \\ 48 \overline{)216.0} \\ \underline{192} \\ 240 \\ \underline{240} \end{array}$$

c. $189 \div 28 =$

$$\begin{array}{r} 6.75 \\ 28 \overline{)189.00} \\ \underline{168} \\ 210 \\ \underline{196} \\ 140 \\ \underline{140} \end{array}$$

Do these divisions: (Express the remainders as decimals.)

2. $85 \div 20$

68 $\div$ 32

320 $\div$ 128

135 $\div$ 36

3. $525 \div 60$

376 $\div$ 64

2255 $\div$ 275

560 $\div$ 64

4. $91 \div 26$

306 $\div$ 72

215 $\div$ 40

351 $\div$ 135

5. $117 \div 52$

378 $\div$ 45

413 $\div$ 56

1512 $\div$ 288

6. $480 \div 64$

289 $\div$ 34

62 $\div$ 25

333 $\div$ 72

7. $837 \div 155$

378 $\div$ 72

209 $\div$ 55

366 $\div$ 48

Fractions Used with Decimals

Mr. Blake runs a stationery store. He buys yellow pencils at \$4.68 a gross (144) and red ones at \$4.80 a gross and sells both kinds at 5¢ each. He asked his daughter Helen to tell him how much he made on each yellow pencil and on each red pencil. Can you do it?

Helen knew that she must find the cost of one pencil of each kind; so she did these divisions. Did the first one come out even? Did the second? Carry the second division 4 decimal places farther, and see what happens.

\$.0325	\$.0333
144) <u>\$4.6800</u>	144) <u>\$4.8000</u>
4 32	4 32
360	480
288	432
720	480
<u>720</u>	<u>432</u>
	48

Helen's brother Paul said: "You carried the divisions farther than you needed to. The second one never would come out even. When you have two decimal places in the quotient, you can express the remainder as a fraction like this": $\longrightarrow$

\$.03 $\frac{1}{4}$	\$.03 $\frac{1}{3}$
144) <u>\$4.68</u>	144) <u>\$4.80</u>
4 32	4 32
36 ($\frac{36}{144} = \frac{1}{4}$)	48 ($\frac{48}{144} = \frac{1}{3}$)

How much did Mr. Blake gain on each kind of pencil?

Divide: (Carry the quotients to two decimal places, then express the remainders as fractions.)

1. 8)\$1.00

2. 16)\$83.00

3. 12)\$604.50

4. 15)3.65

5. 8)16.74

6. 45)11.16

Carry these quotients to one decimal place, then express the remainders as fractions.

7. 9)1.0

8. 25)3.0

9. 60)13.2

10. 45)9.5

11. 16)34.4

12. 12)500.8

Changing Fractions to Decimals

(1) Mr. Bilder is an architect (a man who plans houses). He was drawing the plan of a house to the scale of 1 in. to 8 ft. The bathroom was 7 ft. wide. How wide should it have been on his drawing?

(2) Mr. Bilder's ruler was not divided into 8ths of an inch. It was divided into hundredths of an inch. Mr. Bilder needed to change $\frac{7}{8}$ " to hundredths of an inch. Could you do that? This is the way he did it. He knew that $\frac{7}{8} = 7 \div 8$. So he divided $8 \overline{)7.00}$. $\frac{7}{8}$ " = how many hundredths of an inch?
 $.87\frac{1}{2}$

(3) Mr. Bilder said to his son, "Jim, make a table for me to change $\frac{1}{8}$, $\frac{2}{8}$, $\frac{3}{8}$, etc., to hundredths." Could you do it? Jim did these divisions: $8 \overline{)1.00}$, $8 \overline{)2.00}$, $8 \overline{)3.00}$, etc. He made a table like this for his father. Can you finish it? Copy the table and try.

$\frac{1}{8}$	$\frac{2}{8}$	$\frac{3}{8}$	$\frac{4}{8}$	$\frac{5}{8}$	$\frac{6}{8}$	$\frac{7}{8}$
$.12\frac{1}{2}$	.25					$.87\frac{1}{2}$

(4) The next day Mr. Bilder was working on some plans drawn to the scale of 1 in. to 12 ft. He asked Jim to make another table showing twelfths changed to hundredths. Jim made this table. Copy, and see if you can finish it.

$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$	$\frac{11}{12}$
$.08\frac{1}{3}$		.25			.50			.75		

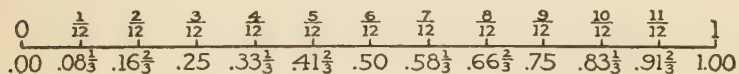
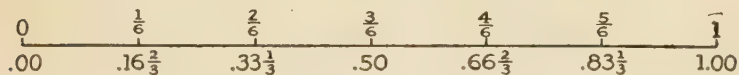
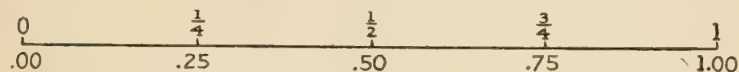
1. Without looking at the tables can you tell to what decimals the following fractions are equal? $\frac{3}{8}$, $\frac{5}{8}$, $\frac{7}{8}$, $\frac{1}{8}$, $\frac{2}{8}$, $\frac{6}{8}$, $\frac{4}{8}$.

2. If you should forget that $\frac{1}{8} = .12\frac{1}{2}$ and did not have the table, how could you change $\frac{1}{8}$ to a decimal? See (3) above.

3. Can you change $\frac{1}{6}$ to a decimal? Does $\frac{5}{6}$ equal $.83\frac{1}{3}$?

Mr. Bilder's Table

From the tables Jim made, Mr. Bilder drew this chart.



1. The bottom line in Mr. Bilder's chart is divided into ____ths. Draw a line 8 inches long and divide it into 16ths. Write 0, $\frac{1}{16}$, $\frac{2}{16}$, $\frac{3}{16}$, $\frac{4}{16}$, etc., where they belong above the line.

2. Can you tell what decimals to write below $\frac{2}{16}$, $\frac{4}{16}$, $\frac{6}{16}$, etc., from one of the other lines in Mr. Bilder's chart? Write them.

3. Now find the decimals that equal $\frac{1}{16}$, $\frac{3}{16}$, $\frac{5}{16}$, etc., and write them under these fractions.

Carrying Decimals Out Even

Some children were changing $\frac{3}{8}$ to a decimal.

(1) Bert did it this way: $\longrightarrow$ $\begin{array}{r} 8 \overline{)3.00} \\ \underline{.37\frac{1}{2}} \end{array}$

(2) Ruth did it this way: $\longrightarrow$ $\begin{array}{r} 8 \overline{)3.000} \\ \underline{.375} \end{array}$

Ruth said, "Our teacher likes to have us carry the divisions till they come out even whenever it is possible."

(2) Bert found by division that $\frac{7}{8} = .87\frac{1}{2}$. Ruth found by division that $\frac{7}{8} = .875$. Were both answers correct?

(3) Ruth said: "I can show that $.87\frac{1}{2} = .875$ this way:

$$.87\frac{1}{2} = \frac{87\frac{1}{2}}{100} = \frac{87\frac{1}{2} \times 10}{100 \times 10} = \frac{875}{1000} = .875."$$

(4) Bert found that $\frac{5}{16} = .31\frac{1}{4}$. Ruth showed that

$$.31\frac{1}{4} = \frac{31\frac{1}{4}}{100} = \frac{31\frac{1}{4} \times 100}{100 \times 100} = \frac{3125}{10000} = .3125. \text{ Does it?}$$

(5) Bert found that $\frac{3}{16} = .18\frac{3}{4}$. Ruth showed that

$$.18\frac{3}{4} = \frac{18\frac{3}{4}}{100} = \frac{18\frac{3}{4} \times 100}{100 \times 100} = \frac{1875}{10,000} = .1875. \text{ Does it?}$$

Bert said: "I see. *If a decimal ends in $\frac{1}{2}$, you can erase the $\frac{1}{2}$ and put a 5 in the next decimal place.*

"If a decimal ends in $\frac{1}{4}$, you can erase the $\frac{1}{4}$ and put 25 in the next two decimal places.

"If a decimal ends in $\frac{3}{4}$, you can erase the $\frac{3}{4}$ and put 75 in the next two decimal places.

"All you have to remember is that $\frac{1}{2} = .5$, $\frac{1}{4} = .25$, and $\frac{3}{4} = .75$."

1. Using Bert's rules, change these to decimals without fractions.

$.16\frac{1}{2}$ $.08\frac{1}{4}$ $.32\frac{3}{4}$ $.29\frac{1}{2}$ $.46\frac{3}{4}$ $.91\frac{1}{4}$ $.34\frac{3}{4}$ $.14\frac{1}{4}$
 $.05\frac{1}{2}$ $.27\frac{3}{4}$ $.08\frac{3}{4}$ $.95\frac{1}{2}$ $.76\frac{1}{4}$ $.39\frac{1}{2}$ $.84\frac{3}{4}$ $.05\frac{1}{4}$

Changing Decimals to Fractions

You should study Mr. Bilder's chart on page 235 until you can say the answers to Examples 1 and 2 below without looking at the chart.

1. What decimal is each of these fractions equal to?

$$a. \quad \frac{1}{2} \qquad \frac{1}{3} \qquad \frac{1}{4} \qquad \frac{1}{5} \qquad \frac{1}{6} \qquad \frac{1}{8} \qquad \frac{1}{12} \qquad \frac{3}{4}$$

$$b. \quad \frac{3}{8} \qquad \frac{3}{5} \qquad \frac{5}{8} \qquad \frac{4}{5} \qquad \frac{7}{8} \qquad \frac{2}{5} \qquad \frac{5}{6} \qquad \frac{2}{3}$$

2. Give in lowest terms the fractions that these decimals equal:

$$a. \quad .25 \quad .33\frac{1}{3} \quad .50 \quad .12\frac{1}{2} \quad .08\frac{1}{3} \quad .16\frac{2}{3} \quad .20 \quad .40$$

$$b. \quad .75 \quad .60 \quad .37\frac{1}{2} \quad .87\frac{1}{2} \quad .80 \quad .66\frac{2}{3} \quad .83\frac{1}{3} \quad .62\frac{1}{2}$$

Suppose that you were working an example in which you needed to know to what fraction the decimal .20 is equal, and that you were unable to recall the fraction. What would you do?

This is an easy way to find out to what fraction it is equal:

$$.20 = \frac{20}{100} = \frac{20 \div 20}{100 \div 20} = \frac{1}{5}.$$

Or suppose you wanted to know to what fraction $.37\frac{1}{2}$ (that is, .375) is equal. You could find out in this way:

$$.375 = \frac{375 \div 5}{1000 \div 5} = \frac{75}{200} \quad \frac{75 \div 5}{200 \div 5} = \frac{15}{40} \quad \frac{15 \div 5}{40 \div 5} = \frac{3}{8}.$$

When the numerator and the denominator of a fraction are so large, it often takes two or three steps to get the fraction to lowest terms.

Change these decimals to fractions:

$$3. \quad .40 = \frac{40}{100} =$$

$$7. \quad .62\frac{1}{2} = .625 = \frac{625}{1000} =$$

$$4. \quad .25 = \frac{25}{100} =$$

$$8. \quad .87\frac{1}{2} = .875 = \frac{875}{1000} =$$

$$5. \quad .75 = \frac{75}{100} =$$

$$9. \quad .06\frac{1}{4} = .0625 = \frac{625}{10000} =$$

$$6. \quad .35 = \frac{35}{100} =$$

$$10. \quad .18\frac{3}{4} = .1875 = \frac{1875}{10000} =$$

Useful Short Cuts

(1) You have learned that $10 \times .25 = 2.5$. That is, 2.5 is 10 times as large as .25. Then, is .25 one 10th as large as 2.5? Let us see, just to make sure.

(2) This example shows that to divide 2.5 by 10 moves the decimal point one place to the _____. This is just the opposite of what happens when you multiply by 10, isn't it?

$ \begin{array}{r} .25 \\ 10 \overline{) 2.50} \\ \underline{20} \\ 50 \\ \underline{50} \\ 0 \end{array} $
--

(3) Do you think that $3.96 \div 10 = .396$? Does $538 \div 10 = 53.8$? Does $.641 \div 10 = .0641$? Divide and see.

(4) Dividing a number by 10 moves the decimal point one place to the left.

(5) $4.697 \times 100 = 469.7$; so $469.7 \div 100 = \underline{\hspace{1cm}}$.

$.3841 \times 100 = 38.41$; so $38.41 \div 100 = \underline{\hspace{1cm}}$.

If you are not sure, divide and see.

(6) Dividing a number by 100 moves the decimal point ____ places to the left.

(7) Try dividing some numbers by 1000. That moves the decimal point ____ places to the ____.

$456.7 \div 10 = 45.\overset{\curvearrowright}{6}7$	$4.567 \div 10 = \overset{\curvearrowright}{4}.567$
$456.7 \div 100 = 4.\overset{\curvearrowright}{56}.7$	$4.567 \div 100 = \overset{\curvearrowright}{.04}567$
$456.7 \div 1000 = \overset{\curvearrowright}{456}.7$	$4.567 \div 1000 = \overset{\curvearrowright}{.004}567$

To divide a number by 10, move the decimal point 1 place to the left.

To divide a number by 100, move the decimal point 2 places to the left.

To divide a number by 1000, move the decimal point 3 places to the left.

Using 10, 100, and 1000

Divide each of these numbers by 10: (Write the answer only.)

1. 5 3 5.8 2 3.7 .63 8 2.4 89

2. 10 .75 .125 .256 4.8 38.4 80 6600 291

3. Divide each number in Examples 1 and 2 by 100; by 1000.

4. To divide a number like .125 by 10, we have to put a ____ before the 1 like this: .0125.

5. To divide a number like .75 by 100, we have to put ____ zeros before the 7 like this: .0075.

6. Does $.2 \div 1000 = .02, .002$, or $.0002$?

Give the answers only:

7. a. 24×10 b. $250 \div 100$ c. 3.6×100 d. $5.84 \div 10$

8. a. $24 \div 100$ b. 250×1000 c. $3.6 \div 1000$ d. 5.84×100

Here is an easy way to remember which way to move the decimal point when you multiply or divide by 10, 100, or 1000:

*Multiplying by a whole number makes a number larger.
Dividing by a whole number makes a number smaller.*

Multiplying 456.789 by 100

Dividing 456.789 by 100

4 5 6 7 8.9

4.5 6 7 8 9

makes the number larger

makes the number smaller

Write only the answers to these examples:

9. 29×10

$.503 \div 100$

$26.5 \div 100$

$.75 \times 1000$

10. $1000 \overline{)2.87}$

$.503 \times 100$

$.003 \div 100$

99×100

11. $.53 \times 100$

$5.2 \div 100$

$.003 \div 1000$

$99 \div 10$

12. $284 \div 100$

19×1000

$.003 \times 10$

$.7 \div 1000$

13. $90 \div 10$

$1000 \times .04$

$.003 \times 100$

$100 \overline{)3700}$

14. $.8 \div 10$

$.04 \div 1000$

$.003 \times 1000$

$1000 \overline{)2.46}$

Raising Chickens*

1. Ralph bought a bantam rooster for 90¢ and three bantam hens for 80¢ each. For all four chickens he paid ____.

2. This is a plan of the coop he built for them and the yard he enclosed. It is drawn to a scale of $\frac{1}{8}$ " to 1 ft. Can you find the dimensions of the coop and of the yard?



3. He paid \$1.00 for a setting of a dozen eggs that he bought for one of his bantams. Only 8 of the eggs hatched ; so the chicks cost him ____¢ each.

4. During six weeks his 8 chicks ate 4 qt. of cracked corn and 8 lb. of mash. The corn cost 8¢ a quart and the mash 6¢ a pound. How much did the feed for six weeks cost?

5. When his chicks were six weeks old, he sold four of them for 30¢ each. How much did he get for the four of them?

6. Since the eggs for his 8 chicks cost \$1.00, the eggs for the 4 chicks he sold cost _____. Since the feed for the 8 chicks cost 80¢ for the six weeks, the feed for the 4 chicks he sold cost _____. Then the eggs and feed together cost _____. He received \$1.20 for the 4 chicks ; so he gained _____ on them.

7. Ralph's sister, Elizabeth, bought a Rhode Island Red rooster for \$1.25 and two Rhode Island Red hens for \$1.10 each. For all three chickens she paid _____.

8. Elizabeth also paid \$1.00 for a setting of a dozen eggs. Nine of the eggs hatched ; so her little chicks cost her _____ cents each. If all the eggs had hatched, each chick would have cost only _____ cents.

9. Elizabeth was offered \$2.00 for six of her little chicks when they were seven weeks old. If she had sold them for that, she would have been getting _____ cents apiece for them.

Oral Review

Make up a very simple example to illustrate each of your answers to the first five questions.

1. If you know the quotient and the divisor, how do you find the dividend?

2. If you know the quotient, the divisor, and the remainder, how do you find the dividend?

3. If you know the number of cents a girl earned each day for a week, how can you find her average daily earnings?

4. If you know a man's yearly salary, how can you find his average monthly salary?

5. If you know the distance traveled by an automobile and the number of hours it traveled, how can you find its rate of traveling?

6. Can you find in the *B* columns a number which matches each number in the *A* columns?

<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>
(1) $\frac{1}{4}$	.08	(6) $.048 \div 8$	.375	(11) $72 \div .8$	9
(2) $.64 \div 8$	.8	(7) $\frac{3}{8}$	.625	(12) $\frac{1}{3}$	90
(3) $\frac{2}{3}$	.25	(8) $.048 \div .8$	.6	(13) $7.2 \div .8$	.09
(4) $.64 \div .8$	8	(9) $.48 \div .8$	.06	(14) $.72 \div .8$	$.33\frac{1}{3}$
(5) $.64 \div .08$	$.66\frac{2}{3}$	(10) $\frac{5}{8}$	.006	(15) $.72 \div 8$	.9

Tell where the decimal points should be placed in these quotients:

<i>a</i>	<i>b</i>	<i>c</i>
2 3 6	3 3	7 6
7. $2.8 \overline{)66.08}$	$5.82 \overline{)19206}$	$.609 \overline{)46284}$
2 9	5 7 2	2 5 9
8. $46.3 \overline{)13427}$	$.98 \overline{)56056}$	$100 \overline{)25900}$
8 2	2 7 6	5 6 8
9. $4.56 \overline{)37392}$	$.46 \overline{)12696}$	$1000 \overline{)568000}$

A Written Review

Do the following divisions, checking each example:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
1.	$.75 \overline{)2925}$	$5.3 \overline{)1.696}$	$3.09 \overline{)259.56}$	$5.9 \overline{)188.8}$	$.18 \overline{)176.4}$
2.	$.846 \overline{)19.458}$	$39 \overline{)281.97}$	$.63 \overline{)226.8}$	$27 \overline{)29.16}$	$.43 \overline{)2236}$
3.	$53 \overline{)455.8}$	$.108 \overline{)291.6}$	$39 \overline{).8346}$	$73 \overline{)1.898}$	$15 \overline{).1230}$
4.	$59 \overline{)188.8}$	$8.9 \overline{)1.869}$	$.083 \overline{)52.29}$	$.83 \overline{).10458}$	$7.9 \overline{)17143}$

Carry each of the following divisions to two decimal places:

5.	$7 \overline{)85}$	$9 \overline{)283}$	$8 \overline{)57.2}$	$7 \overline{)65.4}$	$8 \overline{)4.61}$
6.	$18 \overline{)214}$	$24 \overline{)635}$	$9.8 \overline{)427}$	$3.5 \overline{)243}$	$4.7 \overline{)16.2}$

Change the following fractions to decimals:

7.	$\frac{1}{3}$	$\frac{2}{4}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{5}{6}$	$\frac{2}{5}$	$\frac{7}{10}$	$\frac{5}{10}$
8.	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{1}{16}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{3}{10}$

Change the following decimals to common fractions:

9.	.25	.40	$.12\frac{1}{2}$	$.16\frac{2}{3}$	$.66\frac{2}{3}$	.80
10.	.75	.5	$.37\frac{1}{2}$	$.83\frac{1}{3}$	$.33\frac{1}{3}$	.3

Write in figures:

11. Three hundred forty-two and nine hundred five hundred-thousandths.

12. Ninety-two and ninety-two thousandths.

13. One hundred one and one hundred one millionths.

Progress Test No. 2

Write only the answers to these examples on your paper. Number each answer. (Don't forget to record your score in the Progress Test Record.)

1. $.038$
 $\times .2$

2. $.368 \times 100$

3. $4.68 \div 10$

4. Find the sum of 2.984, 3.805, 2.375, and 10.375.

5. $4\frac{3}{4}$
 $2\frac{2}{3}$
 $1\frac{1}{6}$

6. $9 - 1\frac{3}{8}$

7. $7\frac{1}{3}$
 $- 1\frac{1}{2}$

8. $5\frac{1}{7} \div \frac{3}{7}$

9. Find the cost of $5\frac{3}{4}$ yd. of silk at $\$3\frac{1}{4}$ a yard.

10. The cost of 48 articles at $33\frac{1}{3}\text{¢}$ each can be found by multiplying 48 by the fraction ____.

11. Write in figures four hundred fifty-seven and four hundred fifty-seven ten-thousandths.

Carry these examples to two decimal places:

12. $43\overline{)165.52}$

13. $168\overline{)58.7704}$

14. $21.8\overline{)168.16}$

15. Gas is sold by the cubic foot. In Hatfield the gas company charges 50¢ a thousand cubic feet. If a customer used 5680 cubic feet during the month, what is his gas bill for that month?

16. Alice has $\frac{3}{4}$ of a chocolate bar. If she divides it equally among 4 children, what part of a bar will each child get?

17. If you cut a 12-inch strip of paper into $\frac{3}{4}$ -inch lengths, how many pieces of paper will you get?

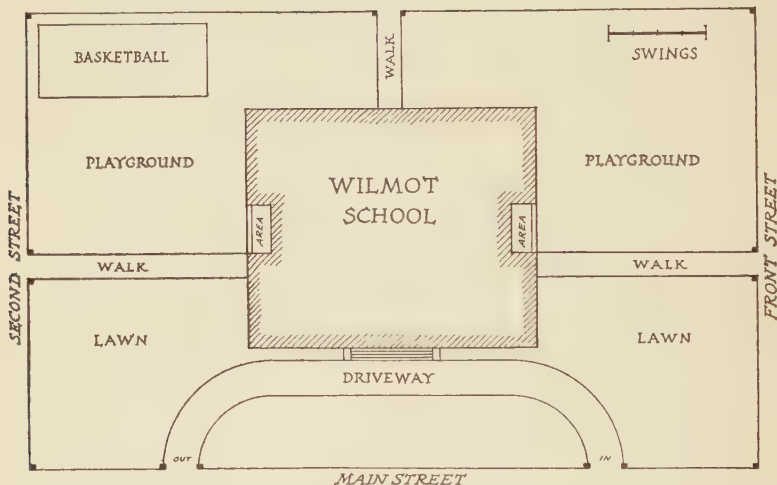
Standards: X, 14. Y, 11. Z, 8.

CHAPTER III

SCALE DRAWINGS — GRAPHS — BANKING

Scale Drawings

1. This picture of the Wilmot School was made by a sixth-grade boy. An eighth of an inch on the plan represents 10 ft. on the playground.



2. Is the scale drawing the same shape as the playground?
3. How long is the school building? How wide?
4. How wide are the walks on the school grounds?
5. How wide is the driveway?
6. How far back from Main Street is the school building?
7. How long are the school grounds? How wide?
8. How long is the basketball court?
9. How long is the frame on which the swings are hung?
10. What is the use of scale drawings?
11. Tell some other distances by measuring the drawing.

Scale Drawings *

12. The School Board bought the 57,000 sq. ft. ground upon which the Wilmot School is built, for \$25,000. How much did it pay per square foot?

13. The scale on a certain map is $\frac{1}{2}''$ to 400 mi. What distance on the map would represent 2000 mi.? 100 mi.?

14. If you are making a drawing to the scale of $1''$ to 25', how long a line will you draw to represent 100'? 300'? 150'? $12\frac{1}{2}'$?

15. Select a convenient scale and make a drawing of a school-room $24' \times 40'$.

16. Measure the dimensions of your schoolroom and then draw a plan of the floor of the room, using a convenient scale.

17. Perhaps some of the boys in your class would be willing to measure the length and the width of your school grounds, of your school building, and of any distances that are laid off on your school grounds. After they give you the dimensions, choose a scale and draw a neat plan of the school and grounds similar to the plan of the Wilmot School on page 244. Mark each part of your drawing, so that any one will be able to understand what each part represents.

18. Compare your school building and grounds with the Wilmot School. For instance, tell which is longer, which is wider, etc., and how much in each case.

19. Find the distance between New York and Chicago from a map in your geography book. Find the distance between New York and San Francisco.

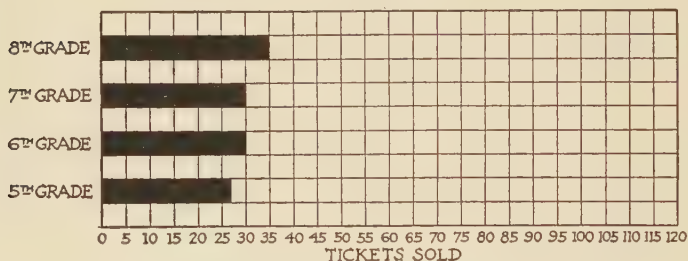
20. Donald was drawing a map to a scale of $1''$ to 200 mi. He had to represent the following distances: 400 mi.; 500 mi.; 100 mi.; 50 mi.; 250 mi. How long a line should he have drawn in each case?

21. If a scale of $1''$ to 3000 mi. is being used, how long a distance is represented by each of these lines? 2 in.; 3.5 in.

Bar Graphs

The Roosevelt School is giving a festival to raise money to buy a victrola for the gymnasium. The fifth, sixth, seventh, and eighth grades are having a contest to see which grade can sell the most tickets. Each morning this week the principal hung a graph in the hall to show which grade was ahead. This is the way the graph looked on Monday morning :

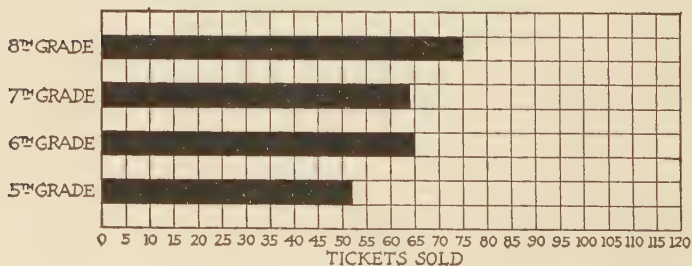
MONDAY'S RECORD



1. The graph shows that the eighth grade had sold 35 tickets. How does it show that?
2. How many tickets had the seventh grade sold? the sixth grade? the fifth grade? (How does the graph show that the fifth grade sold 27 tickets?)

On Tuesday morning this is the way the graph looked :

TUESDAY'S RECORD



Bar Graphs

3. Which grade had sold the most on Tuesday morning? How many had that grade sold?

4. The eighth grade had sold ____ tickets more than the seventh grade, ____ tickets more than the sixth grade, and ____ tickets more than the fifth grade.

5. Which grade had sold the smallest number on Tuesday morning? How many less than each of the other grades had the fifth grade sold?

6. By Wednesday morning the eighth grade had sold 100 tickets; the seventh grade had sold 81 tickets; the sixth grade, 97 tickets; and the fifth grade, 73 tickets. Wouldn't you like to show how their graph looked on Wednesday morning? (Be sure to give your graph a title. How will any person who reads your graph know which of the bars you have drawn represents the Eighth Grade? the Seventh Grade? How will the reader know what the numbers along the bottom of your graph mean?)

7. By Thursday morning, the last day of the contest, the sixth grade was ahead. It had sold 115 tickets; the eighth grade had sold 113 tickets; the seventh grade, 104 tickets; and the fifth grade, 81 tickets. Show these facts on a graph.

8. By Thursday morning how many tickets had the four grades sold all together?

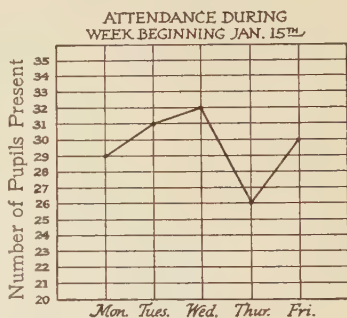
9. The tickets sold for 25¢ each. On Thursday morning the principal said that those four grades had turned in \$102.25 for tickets sold. Is that what they should have turned in?

10. Look in newspapers and magazines at home for graphs. See if you can read any that you find. If possible, bring them to school tomorrow for the rest of the class to see.

11. In an arithmetic test Mary had 15 examples correct; John, 14; William, 13; Mary, 13; James, 11; Harry, 9; Henry, 9; Margaret, 8; Stella, 7. Show these facts on a graph.

Line Graphs

1. This line graph shows the number of pupils present in a sixth-grade room each day of the week beginning January 15. It shows that 29 pupils were present on Monday; — pupils were present on Tuesday; — pupils were present on Wednesday; 26 pupils were present on —; and 30 pupils were present on —.



2. Thursday was a very stormy day. Does the graph seem to show that in any way?

3. How does the graph tell you what the numbers along the left-hand side mean?

4. Make a line graph showing the attendance of the same group of children for the week beginning January 22. (Locate the points on your graph before you draw the lines.) Here are the numbers of children that were present each day of the week: Monday, 30; Tuesday, 29; Wednesday, 32; Thursday, 28; Friday, 24. (What is the *smallest* number you will need along the left-hand side of your graph?)

5. Find out how many children in your room are 10 years old, 11 years old, 12 years old, and so on; then show these facts on a graph.

6. Graphs are pictures which tell a story about number relations. Do you think they tell it clearly, and in such a way that it makes more of an impression on you than if the facts were stated in words? Business men think they do, and so they often use them.

Graphs like the ones on page 246 are called *bar graphs*. Graphs like the one on this page are called *line graphs*.

Practice in Making Graphs

Six schools had a track meet. The table below shows the number of points made by each school:

Webster . . . 37	Harris . . . 18	Franklin . . . 33
Lincoln . . . 40	Edison . . . 45	Washington . . . 28

1. Think how you can show the above facts on a bar graph. Before making the graph answer the following questions:

(1) What title will you give the graph? Where will you write the title?

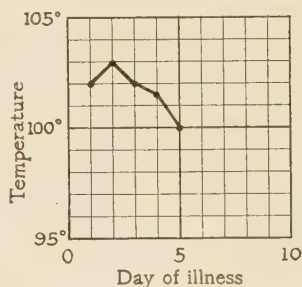
(2) Where will you write the names of the schools?

(3) What scale would be best to use along the bottom of your graph? That is, will you number the lines 0, 1, 2, 3, etc., or 0, 2, 4, 6, etc.? How will you show the reader of your graph what these figures mean?

(4) If you use the scale 0, 2, 4, 6, etc., how far over will you draw the bar that shows the score of the Webster School? the Lincoln School? the Harris School? Go ahead and draw the graph.

2. When Elizabeth was ill, her nurse recorded her temperature on a chart. Part of the chart is shown here. On the first day her temperature was ____ degrees; the second day it was ____ degrees. What was it the third day? the fourth day? the fifth day?

Copy the chart and continue the temperature line for Elizabeth's ten days of illness.



Day of illness	6	7	8	9	10
Temperature	102	103.5	102	101.5	98.5

To locate the point through which the line must pass to show her temperature on the sixth day, you must count to the ____th line to the right of the zero on the horizontal line, and then up to the line which represents 102°. Is the line which represents 102° marked 102? How can you find it?

Oral Problems

1. Find the cost of a dozen class pins at \$3.00 each.
2. Harry saves 8¢ a day. How long will it take him to save \$1.00?
3. Marie has \$1.00. If she buys a 49-cent paintbrush that she wants, how much will she have left?
4. Teddy would like to have a \$2.25 fishing rod and a \$1.25 reel. How much money does he need to buy them both?
5. Mary's mother gave her a quarter and told her to get $\frac{1}{2}$ lb. of cheese that costs 36¢ a pound. The grocer gave Mary 7¢ change. Was that the correct amount?
6. When Billy started a marble game, he had 35 marbles. When he ended it, he had only 19 marbles. How many marbles had he lost?
7. At $66\frac{2}{3}$ ¢ each what is the cost of 15 rosebushes? (Be sure to do this an easy way, without the use of a pencil.)
8. At $33\frac{1}{3}$ ¢ each what is the cost of 2 doz. handkerchiefs? What will 3 doz. cost?
9. We use a quart and a pint of milk a day. How much milk do we use in a week?
10. If a man pays \$40 a month for house rent, what is his yearly rent?
11. Mr. Adams earned \$3600 last year. What were his average monthly earnings?
12. If cream puffs sell at 3 for 10¢, how much will a dozen of them cost?
13. When Mary was helping in her father's store, a man asked for a quarter's worth of pencils that sell two for a nickel. How many pencils should she have given him?

Written Problems

1. How far will an airplane go in $3\frac{1}{2}$ hours if its average speed is 150 miles an hour?

2. What will a 25-dollar overcoat cost at a store which is selling clothing at $\frac{2}{3}$ the usual price?

3. Mr. Clark has just bought a new car. He wondered how many gallons of gas the tank would hold. When the indicator showed the tank to be $\frac{1}{8}$ full, he bought 6 gal. of gas. Then the indicator showed the tank to be $\frac{5}{8}$ full. Mr. Clark figured his tank was large enough to hold 12 gal. of gas. How did he get that?

4. Mrs. Kline paid \$5.00 for a remnant containing $2\frac{1}{8}$ yd. of silk. Do you know how much that silk cost her a yard?

5. If Martha uses $\frac{2}{3}$ cup of milk in a custard for 2 persons how much milk will she need in a custard for 12 persons?

6. My father uses $\frac{3}{4}$ of a book of trolley tickets in a week. The 6 books of tickets he has just bought will last him ____ weeks.

7. When Billy was working in the drug store, a customer bought a half-dozen bars of soap that sold for 3 bars for a quarter, a 25-cent toothbrush, a 38-cent tube of tooth paste, and a 19-cent jar of cold cream. How much change should Billy have given that customer from a 5-dollar bill?

8. A farmer sold 35 chickens for \$26. Tell to the nearest cent the average selling price of each chicken.

9. Allowing .15 lb. of butter a day for each person, how many pounds of butter would be used a day by 75 people? At that rate a tub of butter containing 135 lb. will last ____ days.

10. A farmer bought thirty little ducks for \$14.00. He said: "I'd like to keep $\frac{1}{3}$ of these ducks and sell the others. I wonder how much I should charge for each duck that I sell so that I may collect as much as I paid for the whole 30?" Can you tell him?

Nothing New

- | | | | |
|--|---|---|--|
| 1. 689
× 5800
<hr style="width: 100px; margin-left: 0;"/> | 2. 4.09
× 58.7
<hr style="width: 100px; margin-left: 0;"/> | 3. 458.75
− 399.87
<hr style="width: 100px; margin-left: 0;"/> | 4. 456
987
98
756
774
906
+ 87
<hr style="width: 100px; margin-left: 0;"/> |
|--|---|---|--|
- 5.** Find the difference between 498 and 276.25.
- 6.** Divide 1295.46 by 27.
- 7.** Find the sum of $\frac{7}{8}$, $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{1}{6}$.
- 8.** Find the difference between 7 and $3\frac{5}{8}$.

In each of the next three examples write on your paper the smallest number. Then write the next larger number and so on up to the largest number.

- | | | |
|--|------------------------|------------------------|
| 9. 5,006,743
5,743,006 | 5,060,743
5,743,600 | 5,743,060
5,600,743 |
| 10. $\frac{3}{2}$ $\frac{1}{3}$ $\frac{5}{6}$ $\frac{9}{9}$ $\frac{1}{2}$ $\frac{8}{7}$ $\frac{1}{4}$ $\frac{6}{3}$ | | |
| 11. 269.423
269.243 | 269.0324
629.0024 | 269.324
926.0243 |

Choose the correct words in each of these sentences:

12. Multiplying a number by 100 makes the number ^{larger} and so you move the decimal point ^{three}_{two} places to the ^{left}_{right}.

13. Dividing a number by 1000 makes the number ^{smaller}_{larger}, and so you move the decimal point ^{three}_{four} places to the ^{left}_{right}.

14. If you were making a drawing to a scale of $\frac{1}{2}''$ to 20', you would represent a distance of eighty feet by a line ^{forty}_{two} inches in length, and a distance of ten feet by a line ^{one-fourth inch}_{ten inches} in length.

15. The decimal $.66\frac{2}{3}$ is equal to the fraction ^{two thirds}_{three fourths}.

16. The decimal $.62\frac{1}{2}$ is equal to the fraction ^{five eighths}_{three eighths}.

17. The decimal .075 is larger than the decimal ^{.75}_{.0075}.

Thrift *

1. Benjamin Franklin once said, "A penny saved is a penny earned." What did he mean by that?

2. Do you save a definite amount every week? How much? How much does that amount to in a year?

3. Perhaps you will say, "I am not earning much money; so how can I save any?" It is true that you probably are not earning very much money while you are at school, but if you are wise you are learning to save part of the little you do earn or that you have given you.

4. Many people never learn how to save money. Do you think people should form the habit of saving? Why?

5. You may be saving money to provide for some unexpected needs in the future, or you may be saving toward something that you especially desire to buy.

6. If you put 2¢ a day into a toy bank, name some of the gifts you could buy for your mother, at the end of a single year.

7. If you put away 5¢ a day, how much will you save in a year?

8. It will probably be six years before you are ready for college. If you save 5¢ a day during the first year, 10¢ a day during the second year, 15¢ a day during the third year, 20¢ a day during the fourth year, 25¢ a day during the fifth year, and 30¢ a day during the sixth year, how much will you have saved toward your college expenses?

9. Every family should save at least $\frac{1}{10}$ of its income. How much should a family save each month if its income is \$150? \$120? \$250? \$275? \$300? \$350? Does your family save as much as it should? (Name some common ways of saving money.)

Marie's Banking Experience

(1) Marie Streeter takes care of Mrs. Kline's baby every day after school. Mrs. Kline pays her 20¢ an hour. The first week she worked 9 hours, for which Mrs. Kline gave her _____. The second week she worked $8\frac{1}{2}$ hours, earning _____. The third week she worked 9 hours and 15 minutes, earning _____.

(2) In the three weeks Marie earned _____ all together. She put her money in a toy bank each week as soon as she brought it home. The day after Marie had put her third week's earning in the bank, the Streeter family moved into a new house. During the moving Marie's bank was either lost or stolen.

(3) Marie almost cried when she discovered that her money was gone, but her father said: "We'll never let such a thing happen again. I'll go up to the bank with you after Mrs. Kline pays you this week, and you may open a bank account. A bank is one of the safest places to save money."

(4) That week Marie took care of the baby for $10\frac{1}{2}$ hours; so Mrs. Kline paid her _____.

(5) When Marie's father took her to the bank, they went up to the window over which was written "Receiving Teller," and Mr. Streeter told the clerk (receiving teller) that Marie wanted to open an account with the bank.

(6) The clerk said: "Do you want a *savings account* or a *checking account*?"

(7) Marie said: "I don't know. Which kind is better?"

(8) The clerk said: "That depends on how you wish to use it. If you wish to use it as a convenient way of paying your bills, a checking account is better. But if you wish to use it as a method of saving money, a savings account is what you want. The bank pays you for letting it use the money you put in your savings account. The money the bank pays you is called *interest*."

Marie's Banking Experience

(9) Marie said: "Well, I think I'd like to open a savings account."

(10) The clerk handed her a slip of paper and said: "Fill out this deposit slip."

(11) Mr. Streeter said: "You see, Marie, when you put money in the bank we say you *deposit* your money in the bank and you are called a *depositor*. Each time you come to the bank, you must fill in a deposit slip like this, showing how much you have to deposit."

(12) This is the way the slip looked after Marie had filled it out: —→

(13) In what bank did Marie open her account?

(14) Where does Marie live?

(15) "Currency" on the deposit slip means paper money. Why didn't Marie write \$2.10 on that line instead of only \$2.00?

(16) When Marie handed the receiving teller the deposit slip with the \$2.10, he made out a deposit book, or pass book, for her. The picture on the next page shows how the first page of the pass book looked when he gave it to her. He told Marie to be sure to bring the deposit book with her every time she came to deposit money. Why?

(17) On what date did Marie deposit the \$2.10?

FIRST NATIONAL BANK	
GREENVILLE, PA.	
Deposited by	
<i>Marie Streeter</i>	
Address <i>56 E. King St.</i>	
<i>Greenville, Pa.</i>	
Date <i>4/15/28</i>	
Currency	<i>2 00</i>
Silver	<i>10</i>
Gold	
Checks	
Total	<i>2 10</i>

Marie's Banking Experience

- (18) How does the deposit slip on page 255 show the date?
(19) How would you write April 22 on a deposit slip? July 5?

FIRST NATIONAL BANK GREENVILLE, PA.				
<i>In Account with:</i>				
..... <i>Marie Streeter</i>				
<i>1928</i>				
<i>Apr.</i>	<i>15</i>			<i>210</i>

(See par. (16), p. 225.)

(20) The following week Marie took care of Mrs. Kline's baby for 8 hours and 45 minutes; so she earned _____. She also earned \$1.25 that week by selling Easter eggs. She bought a pair of gloves for which she paid \$1.19; so she had only _____ to deposit in the bank that week.

(21) On April 22 she took her deposit book and the \$1.81 to the bank. Make out a deposit slip like the one Marie had to make out on that date.

Maybe one of you can get some deposit slips from a bank in your neighborhood. If so, you may use them in Example (21).

(22) Show how Marie's deposit book looked after the teller had credited her with the \$1.81. Will the \$2.10 she deposited on April 15 be shown on this page that you are drawing?

(23) On May 1 Marie deposited the money she had earned by taking care of the baby 10 hours and 10 minutes. Make out a deposit slip for her and credit her with the deposit in the deposit book you drew for Example (22).

A Checking Account

(1) Marie has an older brother, Carl, who lives in Yonkers, New York. One day he went to the bank to open a checking account for himself. The teller told him that the bank did not pay interest on money deposited in a checking account.

(2) Carl said he knew that, but he wanted a checking account because it would give him a convenient way to pay his bills.

(3) Carl deposited \$200.00 that day, the 17th of August. *Make out a deposit slip and a deposit book for him.

(4) When the teller handed him his deposit book, he also gave him a check book which contained pages that looked like this :

No. _____	No. _____	YONKERS, N.Y.	192 _____															
To _____	EASTCHESTER TRUST COMPANY																	
For _____	PAY TO THE ORDER OF _____ \$ _____																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">BAL. BROKT FORD</td> <td style="width: 10%;">DOLLARS</td> <td style="width: 10%;">CENTS</td> </tr> <tr> <td>AMT. DEPOSITED</td> <td></td> <td></td> </tr> <tr> <td>TOTAL</td> <td></td> <td></td> </tr> <tr> <td>AMT. THIS CHECK</td> <td></td> <td></td> </tr> <tr> <td>BAL. CASH FORD</td> <td></td> <td></td> </tr> </table>	BAL. BROKT FORD	DOLLARS	CENTS	AMT. DEPOSITED			TOTAL			AMT. THIS CHECK			BAL. CASH FORD			THIS CHECK IS PAYABLE THROUGH ANY MEMBER OF THE NEW YORK CLEARING HOUSE WITHOUT CHARGE FOR EXCHANGE		
BAL. BROKT FORD	DOLLARS	CENTS																
AMT. DEPOSITED																		
TOTAL																		
AMT. THIS CHECK																		
BAL. CASH FORD																		
	DOLLARS																	

(5) The next day, which was the ____ of August, Carl made out a check for \$24.75 to give Mr. Collins in payment for some auto repair work. The next picture shows how the first page of the check book looked then.

No. <u>1</u>	No. <u>1</u>	YONKERS, N.Y.	August 18 192 <u>8</u>															
August 18 1928	EASTCHESTER TRUST COMPANY																	
To J. B. Collins	PAY TO THE ORDER OF <u>J. B. Collins</u> \$ <u>24.75</u>																	
For auto. repairs	<u>Twenty-four and 75/100</u> DOLLARS																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">BAL. BROKT FORD</td> <td style="width: 10%;">DOLLARS</td> <td style="width: 10%;">CENTS</td> </tr> <tr> <td>AMT. DEPOSITED</td> <td>200</td> <td>00</td> </tr> <tr> <td>TOTAL</td> <td>200</td> <td>00</td> </tr> <tr> <td>AMT. THIS CHECK</td> <td>24</td> <td>75</td> </tr> <tr> <td>BAL. CASH FORD</td> <td>175</td> <td>25</td> </tr> </table>	BAL. BROKT FORD	DOLLARS	CENTS	AMT. DEPOSITED	200	00	TOTAL	200	00	AMT. THIS CHECK	24	75	BAL. CASH FORD	175	25	THIS CHECK IS PAYABLE THROUGH ANY MEMBER OF THE NEW YORK CLEARING HOUSE WITHOUT CHARGE FOR EXCHANGE		
BAL. BROKT FORD	DOLLARS	CENTS																
AMT. DEPOSITED	200	00																
TOTAL	200	00																
AMT. THIS CHECK	24	75																
BAL. CASH FORD	175	25																
	<u>Carl Streeter</u>																	

STUB

CHECK

A Checking Account

(6) Carl tore the check out of his check book on the dotted line and sent it to Mr. Collins. The slip to the left of the dotted line he left in his book. That is called a "stub." Why do you think a stub is left in a check book for every check torn out? How much was left in Carl's account after he sent the check to Mr. Collins?

The \$175.25 is called the *balance*.

(7) Why did Carl write the \$24.75 in two ways on his check?

(8) What does the "No. 1" mean in the corner of the check?

(9) A check is a written order or request to a bank to pay a certain person some money. In this check who wrote the order? What did he order to be done? Whom did he order to do it?

(10) When Mr. Collins received the check, he indorsed it; that is, he wrote his name across the back of it at the left end (stub end). Then he took it to the bank, and the bank "cashed" it for him; that is, the bank gave him \$24.75 from Carl Streeter's account. Then the bank stamped "Paid" across the back of it and returned the canceled check to Carl.

NOTE. If Mr. Collins had not indorsed the check, the bank would not have given him the money. His signature on the back of the check is proof that he got the money.

No. <u>2</u>	
September 1, 1928.	
to R. S. Tenter	
For <u>cash</u>	
	DOLLARS CENTS
Bal. Brought Forward	175 25
Amount Deposited	
TOTAL	175 25
Amount This Check	25 50
Balance Carried Forward	149 75

(11) This is the stub that was left in Carl's book after he had sent his second check.

(12) To whom did he send that check?

(13) How much money did he order to be paid to Mr. Tenter? What for?

(14) On what date did Carl make out the check to Mr. Tenter?

(15) Where did the \$175.25 come from that he has written on the stub?

(16) Why is there nothing written on the line marked "Amount deposited"?

A Checking Account

(17) What was the balance in Carl's account after he sent the check to Mr. Tenter?

(18) Pretend that you are Carl Streeter. Make out a check like the one that he sent Mr. Tenter.

(19) The third check that Carl sent was to Mr. C. S. Snyder, for \$7.50 in payment of his club dues. Pretend that you are Carl Streeter. Make out a check like the one he sent Mr. Snyder and also fill in the stub for him.

(20) Before Carl made out his next check, he deposited \$50.00 more to his account. Can you show this fact on the next stub?

(21) Can you show on the same stub used in Example (20) that Carl gave a check for ten dollars to his mother, Mrs. C. N. Streeter, for a birthday gift? Her birthday was the tenth of September. Make out a check like the one he gave his mother.

(22) One day Carl wrote a check to Mr. Farmer for \$3.00. He hadn't his fountain pen with him; so he just wrote it in pencil. Mr. Farmer looked at the check and refused to accept it. He said, "Carl, I think it very foolish of you to write checks with a pencil." Why do you suppose he said that?

(23) Another time Carl gave a check to Mr. Albert. In one place he wrote, "Ten and $\frac{50}{100}$ dollars." In another place on the check he wrote, "\$10.05." Mr. Albert refused to take that check. Why wouldn't he take it?

(24) One day Carl bought a suit of clothes for \$25.00. He paid for the suit by check. Six months later the clothing store from which he had bought the suit sent him a bill for it. Carl took his canceled check down to the store. As soon as they saw it, they admitted they had made a mistake. How did the check prove they had? Is a canceled check as good as a receipt of payment of a bill?

(25) One of Carl's friends told him never to sign his name on a check until after the check was made out. Why?

What You Have Learned about Banking

Look at the check and stub on this page and tell how to fill the blanks below.

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">NO. <u>9</u></td> <td style="width: 50%;">\$ <u>23.75</u></td> </tr> <tr> <td>DATE <u>6/7</u> 192<u>8</u></td> <td></td> </tr> <tr> <td>TO <u>H. M. Winters</u></td> <td></td> </tr> <tr> <td>FOR <u>coat</u></td> <td></td> </tr> <tr> <td>BAL. BRO'T FWD</td> <td style="text-align: right;">DOLLARS CENTS <u>200</u> <u>00</u></td> </tr> <tr> <td>AMT DEPOSITED</td> <td style="text-align: right;"><u>165</u> <u>00</u></td> </tr> <tr> <td>TOTAL</td> <td style="text-align: right;"><u>365</u> <u>00</u></td> </tr> <tr> <td>AMT THIS CHECK</td> <td style="text-align: right;"><u>23</u> <u>75</u></td> </tr> <tr> <td>BAL. CARD FWD</td> <td style="text-align: right;"><u>341</u> <u>25</u></td> </tr> </table>	NO. <u>9</u>	\$ <u>23.75</u>	DATE <u>6/7</u> 192 <u>8</u>		TO <u>H. M. Winters</u>		FOR <u>coat</u>		BAL. BRO'T FWD	DOLLARS CENTS <u>200</u> <u>00</u>	AMT DEPOSITED	<u>165</u> <u>00</u>	TOTAL	<u>365</u> <u>00</u>	AMT THIS CHECK	<u>23</u> <u>75</u>	BAL. CARD FWD	<u>341</u> <u>25</u>	HARRISBURG, PENNA. <u>June 7th</u> 192<u>8</u> No. <u>9</u> THE KEYSTONE BANK OF HARRISBURG <table style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 60%;">PAY TO THE ORDER OF <u>Harry M. Winters</u></td> <td style="width: 40%; text-align: right;">\$ <u>23.75</u></td> </tr> <tr> <td colspan="2" style="padding-top: 10px;"> <u>Twenty-three and 75/100</u> DOLLARS </td> </tr> <tr> <td colspan="2" style="text-align: right; padding-top: 10px;"> <u>John R. Cole</u> </td> </tr> </table>	PAY TO THE ORDER OF <u>Harry M. Winters</u>	\$ <u>23.75</u>	<u>Twenty-three and 75/100</u> DOLLARS		<u>John R. Cole</u>	
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1. On the ____ day of ____, 1928, Mr. ____ wrote a check, ordering The ____ of ____ Penna. to pay to Mr. ____ \$23.75 in payment for a ____ he had bought.
2. He gave the check to Mr. Winters, who took it to the bank and ____ it and received ____.
3. The bank took the \$____ from Mr. ____ account; so that left a balance of only ____ in his checking account.
4. The bank stamped the check "Paid" and returned it to Mr. ____.
5. It was the ____th check Mr. Cole had written.
6. Mr. Cole's balance before he wrote the check for \$23.75 was ____.
7. The amount of Mr. Cole's last deposit was ____.
8. The stub of the next check that Mr. Cole writes will show that the "Balance brought forward" is \$ ____.
9. On June 8, 1928, Mr. Cole deposited \$157.25 and wrote a check for \$37.94, after which his balance was \$ ____.

Writing Checks

1. Pretend that you are Mr. Thomas S. Root and that you had \$175.00 in the bank at Harrington, Minnesota, on April 1, 1929. Make out the checks and stubs that Mr. Root made out when he paid the following bills.

- a. April 2, paid J. R. Black \$84.50 for auto repairs.
- b. April 4, paid M. N. Ritter \$11.00 for shoes.
- c. May 9, paid J. B. Summers \$7.95 for laundry.
- d. May 14, paid W. C. Painter \$5.50 for a hat.

2. Before Mr. Black could get the \$84.50 from the bank, he had to ____ the check.

3. Mr. Root needed \$15.00 in cash on June 1. He made out a check ordering the bank to "Pay to the order of Cash Fifteen and no/100 dollars." This is a customary way to make a check payable to oneself. From whose account did they take the \$15.00?

4. Make out the check which was discussed in Example 3. Also make out the stub.

5. Mr. Root's insurance came due on June 3. He was going to make out a check for \$75.00 to send to the insurance company, but after he looked at his balance he didn't make it out. Why?

6. It would have been unlawful for Mr. Root to write a check for more money than he had in the bank. That is called "overdrawing" an account.

7. On June 4 Mr. Root deposited \$90.00 in his account. Then he made out the check for his insurance. Show how that check looked and how the stub looked.

8. Pretend that you have a checking account in a local bank. Make out a check to a local store in payment for some article of clothing you buy for yourself. Also make out the stub. You may make the amount of money in your account anything from \$25 to \$300.

A Page of Review

1. How much larger is 6 hundredths than 6 thousandths?
2. What is the sum of 6 thousandths and 6 hundredths?
3. Divide 93.48 by 3.45, carrying the answer to 2 decimal places.

$$\begin{array}{r} 4. \quad 579.86 \\ \quad 35.98 \\ 467.45 \\ \quad 9.87 \\ \hline 546.99 \end{array}$$

$$\begin{array}{r} 5. \quad 54.98 \\ \quad \times 1.60 \\ \hline \end{array}$$

$$6. \quad 100 \times 5.98 = ?$$

$$7. \quad .759 \div 1000 = ?$$

$$8. \quad \text{Find the sum of } 2\frac{1}{8}, \frac{3}{4}, \text{ and } 3\frac{3}{16}.$$

$$9. \quad \text{Change } 2\frac{5}{8} \text{ to an improper fraction.}$$

$$10. \quad 1\frac{2}{3} \times \frac{9}{5} = ?$$

$$11. \quad 2\frac{2}{3} \div 1\frac{1}{3} = ?$$

$$12. \quad \frac{5}{8} \times \frac{4}{3} \times \frac{3}{5} = ?$$

13. If the stub of your check book shows a balance of \$47.97 and you make out a check for \$19.25, what will be your new balance?

$$14. \quad \text{Find the cost of } 1\frac{3}{4} \text{ yd. of gingham at } 18\text{¢ a yard.}$$

15. If a girl's marks in 5 subjects are 90, 88, 86, 92, and 85, what is her average mark?

16. If lemons are selling at 3 for 10¢, how much will 2 doz. lemons cost?

$$\begin{array}{r} 17. \quad 6335 \\ \quad - 1376 \\ \hline \end{array}$$

$$\begin{array}{r} 18. \quad 1039 \\ \quad \times 1095 \\ \hline \end{array}$$

$$19. \quad 3 \overline{)5124}$$

20. A camp supply list says that 60 boys need 108 lb. of sugar for 10 days. At that rate how much sugar would 30 boys need for 10 days? for 20 days?

21. Sixty boys would need 40 doz. eggs for 10 days. How many eggs ought 120 boys to take for 10 days? for 20 days?

Reading and Writing Numbers

1. The United States government makes out a budget every year. Here is what it estimated some of its expenses would be in 1928. Read the amounts allowed each department.

DOLLARS NEEDED		DOLLARS NEEDED	
Dept. of Agriculture	144,447,820	Navy Dept.	313,815,500
Dept. of Commerce	35,240,430	State Dept.	11,969,119
Dept. of Interior	285,717,596	Treasury Dept.	170,468,453
Dept. of Justice	25,895,349	War Dept.	366,722,142
Dept. of Labor	8,558,540	Dist. of Columbia	38,519,869

2. How much was needed for the Navy and War departments? How much for all the other departments together?

3. Write these numbers in figures :

- a. Six million, forty-seven thousand, six hundred forty-seven.
- b. Eighty-nine million, six hundred forty-nine thousand.
- c. Eight billion, four hundred twenty-three.

4. What number does each of the following Roman numbers equal?

I	V	X	L	C	D	M	IV	IX
XIX	XX	XL	LX	LXV	XC	CX	CC	CCL
DCC	MD	MC	MCLX	MCMX	MDC	MCCC	LXXV	CXV

5. Numbers like 4, 27, 150, etc., are called ____ numbers.

6. Numbers like $\frac{1}{5}$, $\frac{2}{3}$, $\frac{3}{4}$, etc., are called ____ fractions. They are fractions that are ____ than 1.

7. Numbers like $\frac{5}{2}$, $\frac{4}{3}$, $\frac{2}{1}$, etc., are called ____ fractions. They are equal to or ____ than 1.

8. Numbers like .46, 2.09, .056, etc., are called ____.

9. Ask your teacher to dictate some numbers for you to write.

Adding Denominate Numbers

What numbers belong in these blank spaces?

- | | |
|--|--|
| 1. 24 in. = ____ ft.
2. 32 oz. = ____ lb.
3. 17 in. = ____ ft. ____ in.
4. 16 in. = ____ ft. ____ in.
5. 20 oz. = ____ lb. ____ oz.
6. 37 in. = ____ yd. ____ in. | 7. 25 oz. = ____ lb. ____ oz.
8. 75 min. = ____ hr. ____ min.
9. 121 min. = ____ hr. ____ min.
10. 39 in. = ____ ft. ____ in.
11. 39 oz. = ____ lb. ____ oz.
12. 42 in. = ____ yd. ____ in. |
|--|--|

13. Marie has 4 yards of ribbon. She needs 1 yd. 17 in. to cover a coat hanger, 1 yd. 5 in. to trim a doll's dress, and 1 yd. 16 in. for a bag. Can she get all three pieces from the 4-yd. piece?

This is the way to find out :

- | | |
|--|---|
| 1 yd. 17 in.
1 yd. 5 in.
1 yd. 16 in.
<hr style="border: 0; border-top: 1px solid black; margin: 2px 0;"/> 3 yd. 38 in.
<hr style="border: 0; border-top: 1px solid black; margin: 2px 0;"/> = 4 yd. 2 in. | <p>(1) Add the numbers of inches.</p> <p>(2) Think, "38 in. = ____ yd. ____ in."</p> <p>(3) Write 2 in the inch column. Add 1 to the yd. column.</p> <p>(4) She needs 4 yd. 2 in. and has only ____ yd.</p> |
|--|---|

Add:

- | | | |
|--|--|---|
| 14. 3 ft. 9 in.
2 ft. 6 in.
<u>4 ft. 2 in.</u> | 15. 5 lb. 7 oz.
4 lb. 8 oz.
<u>3 lb. 2 oz.</u> | 16. 2 yd. 30 in.
3 yd. 9 in.
<u>5 yd.</u> |
| 17. 1 hr. 25 min.
2 hr. 30 min.
<u>3 hr. 15 min.</u> | 18. 4 ft. 9 in.
3 ft. 7 in.
5 ft. 2 in.
<u>8 ft. 6 in.</u> | 19. 6 lb. 3 oz.
8 lb. 12 oz.
5 lb. 7 oz.
<u>4 lb. 6 oz.</u> |
| 20. 3 hr. 16 min.
4 hr. 9 min.
45 min.
<u>5 hr. 7 min.</u> | 21. 9 hr. 25 min.
8 hr. 35 min.
7 hr. 15 min.
<u>8 hr. 10 min.</u> | 22. 12 ft. 4 in.
5 ft.
9 ft. 10 in.
<u>15 in.</u> |

Subtracting Denominate Numbers

1. When Bob was visiting his uncle on the farm last fall, he helped make sweet cider. After it was made, Bob measured it as he poured it into the barrel. There were 8 gal. and 1 qt.

That afternoon he sold $3\frac{1}{2}$ gal. to a neighbor. $3\frac{1}{2}$ gal. is ____ gal. ____ qt.

His uncle said to him, "I hope I have 5 gal. of that cider left."

Bob began to wonder how he could find out how much was left in the barrel, without pouring it all out and measuring it. Can you tell how much was there?

(1) To find out, Bob wrote his example like this:

8 gal. 1 qt.
3 gal. 2 qt.

(2) He thought: "I can't take 2 qt. from 1 qt. I'll take 1 gal. from the 8 gal. and think of it as 4 qt. That makes 7 gal. 5 qt. It is easy to subtract 3 gal. 2 qt. from 7 gal. 5 qt." This is the way his example looked when finished:

8 gal. 1 qt.
3 gal. 2 qt.
4 gal. 3 qt.

(3) Did his uncle have as much cider left as he hoped he had?

2. Saturday, when we drove to Dayton, we left home at 1:30 P.M. and arrived in Dayton at 3:08 P.M. My father said, "Well, we made the trip in 1 hr. 38 min." Do you know how he figured that? I do. I worked it out this way:

WHAT I WROTE

3 hr. 8 min.

1 hr. 30 min.

1 hr. 38 min.

WHAT I THOUGHT

2 hr. 68 min.

1 hr. 30 min.

1 hr. 38 min.

3. We started for home at 7:45 P.M. and reached there at 9:25 P.M. Do you know how long it took us to go home?

WHAT TO WRITE

9 hr. 25 min.

7 hr. 45 min.

WHAT TO THINK

8 hr. 85 min.

7 hr. 45 min.

Subtracting Denominate Numbers

1. Mrs. Johnson had 5 yd. of gingham. Alice cut off 1 yd. 20 in. to make a dress for her big doll. There were ____ yd. ____ in. of the gingham left.

2. Dan raised 12 pk. 3 qt. of potatoes in his garden. Joe raised 8 pk. 7 qt. Dan said, "I raised ____ pk. ____ qt. more potatoes than you."

3. Billy had a 12-ft. piece of wire netting. He cut off a piece 1 ft. 8 in. long to cover a window in his chicken coop. Now he has ____ ft. ____ in. of netting left.

Find the difference between:

4. 2 ft. 8 in. and 1 ft. 5 in.

5. 4 lb. 5 oz. and 2 lb. 8 oz.

6. 1 hr. 15 min. and 1 hr. 7 min.

7. 2 hr. 30 min. and 1 hr. 45 min.

8. 2 ft. 10 in. and 4 ft. 3 in.

9. 5 yd. and 2 yd. 12 in.

10. 8 gal. and 5 gal. 3 qt.

11. 9 pk. and 6 pk. 5 qt.

12. 3 min. 2 sec. and 1 min. 5 sec.

13. 7 hr. 35 min. and 8 hr. 25 min.

14. 7 wk. 5 days and 2 wk. 6 days.

15. 8 ft. 5 in. and 5 ft. 8 in.

16. 4 hr. 20 min. and 2 hr. 30 min.

17. 5 gal. 2 qt. and 3 gal. 3 qt.

18. 8 ft. 3 in. and 5 ft. 9 in.

19. 3 hr. 20 min. and 2 hr. 40 min.

20. Do Examples 4 to 19 as addition examples.

Denominate Numbers

1. Find in Column II the correct answer to each example in Column I.

I

- (1) 3 ft. 9 in. + 4 ft. 2 in.
- (2) 4 qt. 1 pt. + 2 qt. 1 pt.
- (3) 5 yd. 2 ft. + 4 yd. 2 ft.
- (4) 7 lb. 4 oz. + 3 lb. 9 oz.
- (5) 4 qt. + 3 qt. 1 pt.
- (6) 3 yd. 1 ft. + 6 yd.
- (7) 5 ft. 5 in. + 2 ft. 8 in.
- (8) 8 lb. 10 oz. + 2 lb. 9 oz.

II

- (a) 10 yd. 1 ft.
- (b) 8 ft. 1 in.
- (c) 11 lb. 3 oz.
- (d) 7 qt.
- (e) 9 yd. 1 ft.
- (f) 7 ft. 11 in.
- (g) 7 qt. 1 pt.
- (h) 10 lb. 13 oz.

2. We spend 40 min. on arithmetic every day. In 2 days we spend 80 min., or ____ hr. ____ min.; in 3 days we spend ____ min., or ____ hr.; in 4 days we spend ____ min., or ____ hr. ____ min.; in a school week we spend ____ min., or ____ hr. ____ min.

3. Last week we were getting ready for a play. We practiced 30 min. every morning and 45 min. every afternoon, which was ____ hr. and ____ min. every day.

4. If we practiced 1 hr. 15 min. every day of a school week, how long did we practice together? How does the following work explain this problem?

$ \begin{array}{r} 1 \text{ hr. } 15 \text{ min.} \\ \times 5 \\ \hline 5 \text{ hr. } 75 \text{ min.} \\ = 6 \text{ hr. } 15 \text{ min.} \end{array} $	$ \begin{array}{r} 1 \text{ hr. } 15 \text{ min.} \\ 60 \overline{) 75 \text{ min.}} \\ \underline{60} \\ 15 \end{array} $
<i>Ans.</i>	

5. In 75 min. there is 1 hr. and ____ min.

Why is it not correct to write the above answer 5 hr. 75 min.?

6. 4 hr. 65 min. should be written ____ hr. ____ min.

7. 5 ft. 18 in. should be written ____ ft. ____ in.

Denominate Numbers

Can you find two errors in these four multiplication examples?

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. 4 ft. 3 in. 4 16 ft. 12 in. = 17 ft.	4 gal. 3 qt. 2 4 gal. 6 qt. = 5 gal. 2 qt.	5 pk. 2 qt. 3 15 pk. 6 qt.	9 ft. 4 in. 7 63 ft. 28 in. = 64 ft. 4 in.

Find the products:

2. 4 lb. 3 oz. 9	2 gal. 3 qt. 4	5 ft. 4 in. 9	3 hr. 20 min. 5
3. 4 ft. 6 in. 7	3 pk. 3 qt. 3	8 lb. 4 oz. 5	3 gal. 2 qt. 6
4. 3 hr. 35 min. 3	5 gal. 3 qt. 7	2 bu. 3 pk. 5	2 yd. 3 ft. 5

5. Twelve girls of the Outing Club are going camping for a week. They saw in a cookbook that they ought to allow 2 oz. of butter for each girl each day. That means that 12 girls would use ____ lb. ____ oz. each day; so for the week they will need ____ lb. ____ oz.

6. They are taking three of these crocks of jam with them. That will give them ____ qt. ____ pt. of jam.



7. They are allowing $1\frac{1}{2}$ pk. of potatoes a day; so for the week they will need ____ bu. ____ pk.

8. The father of one of the girls gave the campers four of these boxes of marshmallows. That was ____ lb. ____ oz. of marshmallows.



Denominate Numbers

1. James's music teacher told him that he ought to average one hour of practice every day. James made this chart. He writes down the time he practices every day. During the first week he practiced all together ____ hr. ____ min.

MUSIC PRACTICE CHART

	FIRST WEEK	SECOND WEEK
Sun.	50 min.	1 hr. 5 min.
Mon.	55 min.	15 min.
Tues.	1 hr. 10 min.	1 hr. 45 min.
Wed.	1 hr.	1 hr. 30 min.
Thurs.	1 hr.	1 hr. 35 min.
Fri.	1 hr. 15 min.	1 hr. 50 min.
Sat.	1 hr. 25 min.	45 min.

2. If he practices 7 hr. 35 min. in 7 days, what was his average amount of practice a day?
 7)7 hr. 35 min. Did he practice as much as he is supposed to?
 ? hr. ? min.

3. The second week he practiced ____ hr. ____ min. all together. What was his average daily amount of practice during the second week?

4.

$$\begin{array}{r} 7 \overline{)8 \text{ hr. } 45 \text{ min.}} \\ 1 \text{ hr. } 15 \text{ min.} \end{array}$$
 In doing this division example think :
 $8 \text{ hr.} \div 7 = 1 \text{ hr.}$ and 1 hr. left over.
 Change the 1 hr. left over to 60 min. $60 \text{ min.} + 45 \text{ min.} = 105 \text{ min.}$
 $105 \text{ min.} \div 7 = 15 \text{ min.}$ His average amount of practice each day the second week was ____ hr. and ____ min.

5. Can you find one third of 7 ft. 9 in.?
 In this division $7 \text{ ft.} \div 3 = \text{__ ft.}$ and ____ ft. left over. Change the 1 ft. left over to ____ in.
 $12 \text{ in.} + 9 \text{ in.} = \text{__ in.}$ $21 \text{ in.} \div 3 = \text{__ in.}$

Can you find a mistake in one of these examples?

6.
$$\begin{array}{r} 3 \overline{)4 \text{ ft. } 5 \text{ in.}} \\ 1 \text{ ft. } 5\frac{2}{3} \text{ in.} \end{array}$$
 7.
$$\begin{array}{r} 5 \overline{)12 \text{ ft. } 4 \text{ in.}} \\ 2 \text{ ft. } 5\frac{3}{5} \text{ in.} \end{array}$$
 8.
$$\begin{array}{r} 4 \overline{)15 \text{ gal. } 2 \text{ qt.}} \\ 3 \text{ gal. } 4\frac{1}{2} \text{ qt.} \end{array}$$
9. $5 \text{ gal. } 1 \text{ qt.} \div 2$ 10. $14 \text{ qt. } 1 \text{ pt.} \div 3$ 11. $3 \text{ hr. } 15 \text{ min.} \div 4$
 12. $5 \text{ lb. } 1 \text{ oz.} \div 4$ 13. $6 \text{ bu. } 3 \text{ pk.} \div 4$ 14. $3 \text{ hr. } 20 \text{ min.} \div 2$

An Oral Review Lesson

There are three answers given for each of these examples. Choose the correct one. Do not use a pencil.

	a	b	c
1. 3.54×20.4	722.16	72.216	7.2216
2. $241.28 \div 3.2$	7.54	.754	75.4
3. 39.54×100	.3954	3954	395400
4. $4.832 \div 100$	.4832	483.2	.04832
5. $\frac{3}{7} + \frac{4}{7}$	1	$\frac{7}{14}$	7
6. $\frac{2}{3} \times \frac{3}{4}$	2	$\frac{1}{2}$	$\frac{6}{12}$
7. 5×3 ft. 3 in.	15 ft. 15 in.	16 ft. 5 in.	16 ft. 3 in.
8. MDLIX is the Roman numeral for	1509	1559	1059
9. 3,079,000 is read	(a) three million, seventy-nine hundred ; (b) three million, seventy-nine thousand ; (c) three million, seventy-nine.		

10. When ice cream sells for \$1.90 a gallon, will 6 qt. cost \$2.80 or \$2.85 or \$11.40?

11. At $37\frac{1}{2}\text{¢}$ each will the cost of two dozen men's collars be \$9.00 or \$6.28 or \$8.00?

12. At 66 $\frac{2}{3}$ ¢ each will the cost of a dozen and a half pairs of men's socks be \$16.00 or \$12.00 or \$6.00?

13. If you know how far you have traveled and how many hours you have been traveling, can you find your rate of traveling by multiplying or by dividing or by adding?

14. Does $9 - 2\frac{5}{8} = 7\frac{3}{8}$, $6\frac{5}{8}$, or $6\frac{3}{8}$?

15. Is .00021 read as 21 thousandths or as 21 millionths or as 21 hundred-thousandths?

A Review Lesson

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. $\begin{array}{r} 5 \text{ hr. 30 min.} \\ + 2 \text{ hr. 35 min.} \\ \hline \end{array}$	$\begin{array}{r} 47.98 \\ \times 2.05 \\ \hline \end{array}$	$\begin{array}{r} 2\frac{3}{4} \\ + \frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} 12\frac{3}{16} \\ - 8\frac{7}{8} \\ \hline \end{array}$
2. $\begin{array}{r} \$4.80 \\ \times 5\frac{2}{3} \\ \hline \end{array}$	$\begin{array}{r} .063 \\ \times .039 \\ \hline \end{array}$	$\begin{array}{r} 5 \text{ gal. 1 qt.} \\ - 2 \text{ gal. 3 qt.} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{3}{8} \\ + 2\frac{3}{4} \\ \hline \end{array}$
3. $\frac{1}{4} + \frac{5}{6} + \frac{1}{3}$	$25.4 \overline{)79.248}$	$84 \overline{)759}$	$98.7 \overline{)20.8257}$
4. 100×475.6	$\frac{5}{12} + \frac{4}{9} + \frac{5}{6}$	$8 \div \frac{1}{3}$	$1\frac{5}{8} \times \frac{3}{11}$
5. $.043 \overline{)8.6}$	$5 \overline{)6 \text{ ft. 3 in.}}$	$9 \overline{)72}$	$6 \overline{)5 \text{ gal. 3 qt.}}$
6. $5 \times 3 \text{ pk. 1 qt.}$	$.33\frac{1}{3} = \frac{1}{?}$	$7 \overline{)8 \text{ pk. 2 qt.}}$	$.66\frac{2}{3} = \frac{2}{?}$
7. 1000×4.756	$36 \div \frac{1}{2}$	$28 - 1\frac{7}{8}$	$3\frac{1}{2} \times \frac{3}{5}$
8. $3\frac{1}{9} - 2$	$2\frac{1}{2} \div 1\frac{2}{3}$	$10 \times .046$	$.94 \overline{)0.03008}$

Do these divisions, carrying each to two decimal places :

9. $8 \overline{)631}$ 10. $92 \overline{)75.4}$ 11. $87 \overline{)3179}$ 12. $6.8 \overline{)275}$

13. Change each of these decimals to its equivalent common fraction: .75; .50; .60; .375.

14. Change each of these fractions to its equivalent decimal: (Carry to two decimal places.) $\frac{1}{3}$; $\frac{2}{3}$; $\frac{1}{4}$; $\frac{1}{8}$; $\frac{5}{8}$; $\frac{1}{6}$.

15. When $\frac{1}{4}$ in. is used to represent a mile on a scale drawing, a line $3\frac{1}{2}$ in. long on the drawing represents ____ miles.

16. There are two kinds of bank accounts. They are ____ accounts and ____ accounts.

17. The money that the bank pays you for letting it use the money you put in a savings account is called ____.

Progress Test No. 3

Write only the answers to these examples on your paper.
Number each answer. (Record your score.)

1. \$2999.75

486.39

9876.54

39.87

569.84

39.76

2. $176.81 - 56.925$

3. $2\frac{2}{3} + 4\frac{3}{4}$

4. $.62\frac{1}{2} = \frac{?}{?}$

5. $2.59 \div 100$

6. $25 - 1\frac{2}{3}$

7. $3\frac{1}{3} \div 2\frac{1}{2}$

8. 10×2.57

9. $8 \overline{)40}$

10. Divide, carrying the answer to two decimal places : $75 \overline{)24.6}$

11. $\frac{1}{2}$ of 3 pk. 2 qt. =

12. 2×5 gal. 2 qt. =

13. How much would James earn in an hour if he earns \$.18 in 20 minutes?

14. Marie uses this recipe for candy :

Fudge : 4 cups of sugar, 1 cup of milk, 3 oz. chocolate.

She wants to use 6 cups of sugar. How much of each of the other articles should she use?

15. An automobile owner estimated that he paid \$.013 a mile for gasoline, \$.012 a mile for oil, \$.075 a mile for tires, \$.006 a mile for repairs, \$.065 a mile for depreciation and interest. How much would it cost him to operate his car for 10,000 miles?

16. Find the total cost of 6 lb. of lamb at 42¢ a lb., 3 lemons at 36¢ a dozen, 10 lb. of sugar at $7\frac{1}{4}\text{¢}$ a pound, and $\frac{1}{4}$ lb. of butter at 50¢ a pound.

Standards: X, 14. Y, 12. Z, 9.

CHAPTER IV

PER CENTS

Meaning of Per Cents

1. All this month the Reliable Sporting Goods Store has had a bicycle in the window, marked \$28.50. Ned wanted it very much, but he had only \$26.00 saved toward a bicycle; so of course he couldn't get it. Yesterday the store pasted a big sign across the window, "10% discount on every article in this window."

2. Ned went in and asked what that meant. Do you know?

3. He was told that it meant that the price of each article in the window would be reduced 10 *per cent*; that is, 10 *hundredths*, or $\frac{10}{100}$.

Per cent means hundredths.

The sign % means per cent.

4. Ned thought, "10 hundredths of \$28.50 is $.10 \times \$28.50$ or ____."

5. "If the price of the bicycle is reduced \$2.85, it will cost me only ____." Has Ned enough money to buy it?

6. There was a tennis racket in the window, marked \$5.50. How much would that cost after the price had been reduced 10%?

7. A \$4.50 swimming suit would cost only ____ after the price had been reduced 10%.

8. A \$1.25 baseball bat would cost only ____ after the price had been reduced 10%.

Read these decimals as hundredths and as per cents:

9. .02 .50 $.66\frac{2}{3}$ $.37\frac{1}{2}$ $.16\frac{2}{3}$.01

10. .65 $.33\frac{1}{3}$ $.12\frac{1}{2}$ $.62\frac{1}{2}$ $.08\frac{1}{2}$.05

Tell what decimal each of the following per cents equals:

11. 75% 25% $12\frac{1}{2}\%$ $62\frac{1}{2}\%$ 15% 29% 90% $87\frac{1}{2}\%$ 10% 9%

Using Per Cent

(1) The Clothing Store in which Harold Thompson works is sending out the following sale notice. The owner asked Harold to figure out the new prices that are to be filled in on the sale notice. Can you do it?

SALE NOTICE!					
<i>All Goods Selling at 75% of Original Price</i>					
OLD PRICE			NEW PRICE		
Hats	\$	2.40	Sweaters	\$	4.50
Overcoats	\$	32.00	Ties	\$	1.20
Shoes	\$	8.00	Collars	\$	.32
Gloves	\$	1.80	Shirts	\$	1.50
Stockings	\$	.98	Suits	\$	25.00

(2) In finding the new price of hats, Harold thought, "75% of \$2.40 means $.75 \times \$2.40$, which equals \$1.80." Was Harold right?

(3) This is the way he found the new price of the overcoats: $.75 \times \$32.00 = \underline{\hspace{2cm}}$. Is that the right way to do it?

(4) He found the new prices of the other articles in the same way. You find them, too.

Complete these sentences:

1. To find 20% of 235, I think: $20\% = 20$ hundredths; $.20 \times 235 = \underline{\hspace{2cm}}$.

2. To find 35% of 84, I think: $35\% = \underline{\hspace{2cm}}$ hundredths; $.35 \times 84 = \underline{\hspace{2cm}}$.

3. To find 42% of 75, I think: $42\% = \underline{\hspace{2cm}}$ hundredths; $.42 \times 75 = \underline{\hspace{2cm}}$.

4. To find 5% of 30, I think: $5\% = \underline{\hspace{2cm}}$ hundredths; $.05 \times 30 = \underline{\hspace{2cm}}$.

Per Cents Made Easy

1. Donald says that he knows a short way to find 75% of \$1.20. This is the way he does it: $\longrightarrow$
Explain his work.

$$\begin{array}{l} 75\% = .75 = \frac{3}{4} \\ \quad .30 \\ \hline \frac{3}{4} \times \$1.20 = \$.90 \end{array}$$

2. 75% of 16 = $.75 \times 16 = \frac{3}{4} \times 16 = \underline{\hspace{2cm}}$.

3. 25% of 16 = $.25 \times 16 = \frac{1}{4} \times 16 = \underline{\hspace{2cm}}$.

4. 50% of 16 = $.50 \times 16 = \frac{1}{2} \times 16 = \underline{\hspace{2cm}}$.

5. If you want to find 75% of 40, is it shorter to multiply 40 by .75 or to find $\frac{3}{4}$ of 40? Do you get the same answer in both cases?

Try these examples mentally. Look at the helps if you need to.

EXAMPLES

6. 25% of 48

7. 50% of 60

8. 80% of 80

9. 60% of 50

10. 75% of 60

11. $33\frac{1}{3}\%$ of 60

12. $37\frac{1}{2}\%$ of 24

13. $12\frac{1}{2}\%$ of 96

HELPS

$25\% = .25 = \frac{1}{4}$

$50\% = .50 = \frac{1}{2}$

$80\% = .80 = \frac{4}{5}$

$60\% = .60 = \frac{3}{5}$

$75\% = .75 = \frac{3}{4}$

$33\frac{1}{3}\% = .33\frac{1}{3} = \frac{1}{3}$

$37\frac{1}{2}\% = .37\frac{1}{2} = \frac{3}{8}$

$12\frac{1}{2}\% = .12\frac{1}{2} = \frac{1}{8}$

It will be easier to work some of these examples by multiplying by fractions; others will be easier if you multiply by decimals. Choose the easier way to do each example.

a

14. 25% of 40

15. $62\frac{1}{2}\%$ of 88

16. 50% of 67

17. $16\frac{2}{3}\%$ of 36

18. 17% of 92

19. $62\frac{1}{2}\%$ of 488

b

10% of 1000

$33\frac{1}{3}\%$ of 300

5% of 1600

19% of 254

25% of 484

30% of 560

c

14% of 79

$12\frac{1}{2}\%$ of 240

12% of 95

$66\frac{2}{3}\%$ of 36

36% of 36

$37\frac{1}{2}\%$ of 560

Using Per Cent

1. There are 30 children in our schoolroom. 50% of them are boys. How many boys are there in the room? How many girls?

2. 70% of the 30 children in our room have never been absent. That means ____ children in our room have never been absent.

3. Our teacher said that 90% of the 30 children in our room are passing in arithmetic. That means ____ children are passing in arithmetic.

4. We had a spelling test yesterday. There were 40 words in the test. The teacher told me I had spelled 80% of them correctly. I must have spelled ____ words correctly.

5. My friend, Jean, spelled 90% of the 40 words correctly. She must have spelled ____ words correctly.

6. Ted spelled 75% of the 40 words correctly. He spelled ____ words correctly.

Find:

7. 75% of 40	60% of 34	20% of 75
8. 65% of 85	80% of 24	30% of 64
9. 29% of 42	25% of 76	50% of 82
10. 83% of 65	75% of 34	15% of 70
11. 70% of 28	10% of 23	25% of 60
12. 5% of 100	6% of 72	4% of 63
13. 8% of 250	7% of 34	2% of 275
14. 5% of 36	4% of 16	1% of 90
15. 2% of 36	25% of 16	$33\frac{1}{3}\%$ of 12
16. 6% of 72	8% of 16	3% of 12
17. 4% of 280	2% of 230	8% of 64
18. 3% of 150	50% of 230	$12\frac{1}{2}\%$ of 64

Per Cents — Decimals — Fractions

You will save yourself a lot of work if you learn the following table. How many facts in the table do you know now? *Learn the others today.* (It may help you to go back to page 235 and make the tables for Mr. Bilder again.)

$5\% = .05 = \frac{1}{20}$	$40\% = .40 = \frac{2}{5}$
$8\frac{1}{3}\% = .08\frac{1}{3} = \frac{1}{12}$	$50\% = .50 = \frac{1}{2}$
$10\% = .10 = \frac{1}{10}$	$60\% = .60 = \frac{3}{5}$
$12\frac{1}{2}\% = .12\frac{1}{2} = \frac{1}{8}$	$62\frac{1}{2}\% = .62\frac{1}{2} = \frac{5}{8}$
$16\frac{2}{3}\% = .16\frac{2}{3} = \frac{1}{6}$	$66\frac{2}{3}\% = .66\frac{2}{3} = \frac{2}{3}$
$20\% = .20 = \frac{1}{5}$	$75\% = .75 = \frac{3}{4}$
$25\% = .25 = \frac{1}{4}$	$80\% = .80 = \frac{4}{5}$
$30\% = .30 = \frac{3}{10}$	$83\frac{1}{3}\% = .83\frac{1}{3} = \frac{5}{6}$
$33\frac{1}{3}\% = .33\frac{1}{3} = \frac{1}{3}$	$87\frac{1}{2}\% = .87\frac{1}{2} = \frac{7}{8}$
$37\frac{1}{2}\% = .37\frac{1}{2} = \frac{3}{8}$	$90\% = .90 = \frac{9}{10}$

1. Earl King gets a salary of \$25 a week. At the end of this year he is to get a 20% increase in salary. 20% of \$25 is $\frac{1}{5}$ of \$25, or ____ dollars.

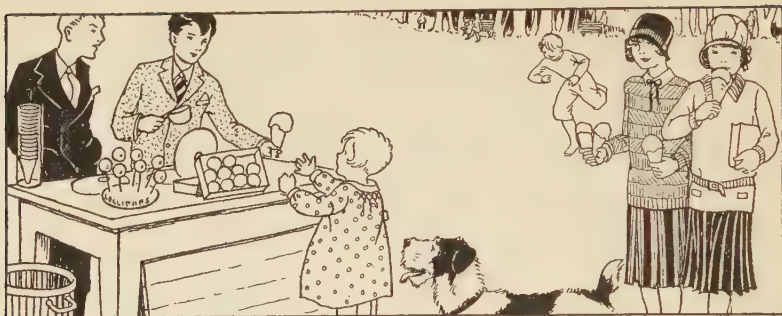
2. How much will Earl's salary be after it is increased?

3. Our teacher told us that about 90% of the children in our room would pass into seventh grade next year. There are 30 children in our room, so that means $.90 \times 30$ children, or ____ children, will pass into seventh grade. How many will fail?

4. We are given 10% off our gas bill if we pay it before the 10th day of the month. This month our gas bill was \$3.92. We paid it the 8th day of the month so the company took ____ off the bill. That meant we had to pay only ____.

5. Would you rather buy a coat for 75% of its value or for $\frac{7}{10}$ of its value?

The Ice-Cream and Candy Stand *



Last summer John and Michael opened a little ice-cream and candy stand near the park.

1. They found that they could buy cones for the ice cream for \$2.50 per M. That meant that each cone cost them only ____.

2. They also found that one gallon of ice cream, which cost them \$1.40, would fill 40 cones. That made the cost of the ice cream for one cone ____.

3. They sold their cones for 5¢ each. Since the cones filled with cream cost them $\$.03\frac{3}{4}$ apiece, they gained ____ on each ice-cream cone.

4. One morning they opened up a box of 1000 cones. In the evening there were 240 cones left in the box. John said, "Since we gain $\$.01\frac{1}{4}$ on each ice-cream cone that we sell, we've cleared \$9.50 on the ones we sold today." Do you know how he figured that out?

5. They bought lollipops for \$1.20 a gross and sold them for one cent each. How much did they gain on a gross of lollipops? (Remember that one gross = twelve dozen.)

6. They bought coconut balls at 15¢ a dozen and sold them at 2¢ each or 3 for 5¢. Michael said: "I hope all our customers buy three. We gain ____¢ when we sell one for 2¢, but we gain ____¢ when we sell 3 for 5¢." (HINT. How much did each ball cost? How much did three cost?)

Problems Using Per Cents

1. Tom, Bill, and Joe have gone into business, selling balloons, balls, and peanuts on circus day. Tom provided most of the money with which they bought their stock. Bill and Joe built the stand. They decided that Tom should get 50% of the profits, and Bill and Joe each 25%. They cleared \$18.28; so Tom took ____, Bill took ____, and Joe took ____.

2. Our school nurse says that 30% of the children in our room are under weight. Since there are 30 children in the room, there must be ____ children under weight.

3. The football captain of Edison Junior High School announced that the school won 75% of the 12 games played that year. They must have won ____ games.

4. Mr. Raymond said to Robert, "If you sell this porch swing for \$12.00, you may keep 5% of the money." How much may Robert keep?

5. Mrs. Wall was considering buying a coat marked \$45.00. The merchant said, "Mrs. Wall, if you buy this coat today, and pay cash for it, you may have it for 90% of the marked price." Mrs. Wall said that would be ____.

6. We had a test in arithmetic yesterday. There were 20 examples in the test. Our teacher didn't give us back our papers; but she posted our marks. I had 75%. I must have had ____ examples correct. Dorothy's mark was 100%. She must have had ____ examples correct. Ted had 90%. He must have had ____ examples correct.

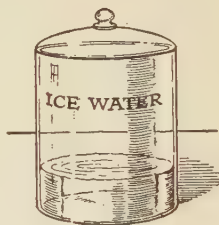
7. If I buy a \$650 piano for 85% of its value, how much must I pay for it?

8. Hunt through the newspaper this evening for all the places where you find per cents mentioned. Read the articles or advertisements carefully and see whether you can understand them. If possible, cut them out and bring them to school tomorrow to discuss them with the rest of the class.

Sentences to Complete

Tell how to complete these sentences:

1. $\frac{2}{3}$ of any number equals ____ per cent of the number.
2. To find 6% of a number multiply the number by ____.
3. This water jar is about ____ per cent full.
4. About ____ per cent of this jar is empty.
5. 1% of 532 is ____.
6. $12\frac{1}{2}\%$ equals the common fraction ____.
7. .375 is the same as ____ per cent.
8. 70% written as a decimal looks like this: ____.
9. 80% of a number is ____ times as large as 40% of a number.
10. 25% of a number is ____ ____ as large as the number.
11. 60% of a number is ____ times as large as 30% of the number.
12. About ____ per cent of this rectangle is shaded.
13. 69% written as a fraction would have ____ for a numerator and ____ for a denominator.
14. The easiest way to find $62\frac{1}{2}\%$ of a number is to find ____ of the number.
15. This picture shows about ____ per cent of a pie. About ____ per cent of this pie has been eaten.
16. ____ per cent of a pie equals the whole pie.
17. 75% of 24 is ____.
18. 9% of 20.1 is ____.
19. .65 of a number is ____ per cent of the number.
20. 6% of 35 is ____.



Per Cents Greater than 100%

(1) Norman built a lawn bench at a cost of \$3.00 for materials. As he was painting it he said, "I want to sell this to gain 75%." His friend Walter said: "75% of \$3.00 is only _____. If I were you, I'd try to sell it to gain 90%. That would be a gain of _____."

(2) The next day Norman said to Walter, "Well, I sold the bench at a gain of 100%." Do you know how much he gained on the bench? ($100\% = \frac{100}{100} = 1$. 100% times a number equals one times the number. 100% of \$3.00 equals one times \$3.00 or _____.) Norman sold the bench for _____.

(3) *Walter*: "I made a bird house the other day and sold it at a gain of 200%."

Norman: "What did the material cost?"

Walter: "Only a dollar."

What did Walter get for the bird house? (First think: "What did he gain? $200\% = \frac{200}{100} = 2$. 200% of a number is $2 \times$ the number. He gained 200% of \$1.00, or _____; so he must have sold the bird house for _____.")

(4) *Norman*: "That's nothing. I bought 25¢ worth of popcorn once, popped it, and then sold it for a dollar. That was a gain of _____¢, which is _____% of the cost."

$$1. \quad 150\% \text{ of } 36 = \frac{150}{100} \text{ of } 36 = \frac{3}{2} \times \overset{18}{\cancel{36}} = 54$$

$$2. \quad 125\% \text{ of } 36 = \frac{125}{100} \text{ of } 36 = \frac{5}{4} \times \overset{9}{\cancel{36}} = ?$$

$$3. \quad 250\% \text{ of } 36 = \frac{250}{100} \text{ of } 36 = \frac{5}{2} \times 36 = ?$$

$$4. \quad 340\% \text{ of } 15 = \frac{340}{100} \text{ of } 15 = \frac{17}{5} \times 15 = ?$$

5. 100% of a number is one times the number; 150% of a number is _____ times the number; 200% of a number is _____ times the number; 250% of a number is _____ times the number.

6. The population of Spring Lake was 800 in 1917. I heard that it has increased 200% since then; so it must be _____ now.

Larger Per Cents

1. $80\% = .80$. To find 80% of a number, multiply the number by ____.

2. $90\% = .90$. To find 90% of a number, multiply .

3. $100\% = 1.00$. To find 100% of a number, multiply . . .

4. $110\% = 1.10$. To find 110% of a number, multiply the number by ____.

5. $200\% = 2.00$. To find 200% of a number, multiply the number by ____.

6. 80% of 40 =

7. 50% of 60 =

8. 25% of 80 =

90% of 40 =

80% of 60 =

75% of 80 =

100% of 40 =

100% of 60 =

100% of 80 =

110% of 40 =

150% of 60 =

200% of 80 =

200% of 40 =

180% of 60 =

500% of 80 =

9. Does 100% of a number always equal the number itself?

10. Is 70% of a number less than or more than the number?

11. Is 170% of a number less than or more than the number?

12. 100% of 256 equals ____; 69% of 256 is ____ than 256; 169% of 256 is ____ than 256.

13. What would you multiply by to find the following per cents of a number?

100% 125% 150% 200% 250% 300% 800%

14. Which of these is the easier way to find 125% of 60?

(a) 1.25×60

or

(b) $1\frac{1}{4} \times 60$

15. Which of these is the easier way to find 150% of 80?

(a) 1.50×80

or

(b) $1\frac{1}{2} \times 80$

16. Can you find $166\frac{2}{3}\%$ of 27? Do you see that $166\frac{2}{3}\%$ of 27 is $1\frac{2}{3} \times 27$?

17. What is $187\frac{1}{2}\%$ of 64? ($187\frac{1}{2}\% = 1\frac{7}{8}$)

18. 200% of 96 =

19. 250% of 48 =

20. $133\frac{1}{3}\%$ of 99 =

300% of 150 =

325% of 64 =

$116\frac{2}{3}\%$ of 36 =

A Twenty-Minute Test

- | | | | | |
|----------|---------------|--|-----------|----------------------|
| 1. 9 | 2. \$456.89 | 3. 67.5 | 4. 50.09 | 5. 68.05 |
| 4 | 723.48 | $\times .43$ | $- 48.95$ | $\times 20.68$ |
| 7 | 87.67 | | | |
| 8 | 954.89 | | | |
| 6 | 40.06 | | | |
| 5 | <u>987.95</u> | 6. $\frac{1}{3} + \frac{1}{4} + \frac{3}{8}$ | | 7. $.75 \times 3.25$ |
| 6 | | | | |
| <u>7</u> | | | | |

- | | | |
|-------------------|-------------------|----------------------|
| 8. <u>.7)9.94</u> | 9. <u>6)84.46</u> | 10. <u>.96)50.88</u> |
|-------------------|-------------------|----------------------|

11. If caramels sell for 60¢ a pound, what part of a pound can you get for 1¢? 5¢? 10¢? 20¢? 30¢? 40¢?

12. How many ounces are there in $\frac{1}{2}$ lb.? $\frac{1}{4}$ lb.? $\frac{1}{8}$ lb.? $\frac{3}{8}$ lb.?

13. Find $66\frac{2}{3}\%$ of 600.

17. Find $33\frac{1}{3}\%$ of 255.

14. Find 200% of 450.

18. Find $87\frac{1}{2}\%$ of 240.

15. Find 225% of 640.

19. Find $62\frac{1}{2}\%$ of 320.

16. Find 325% of 28.

20. Find 150% of 600.

21. The enrollment in our school was 450 in 1920. In 1925 it had increased 50%, which made it ____; by 1928 it had increased 100%, which made it _____. If it increased 200%, it would be _____.

22. Merrill Black put the shot 27 ft. 2 in. Alan White put it 25 ft. 9 in. Merrill won by ____ ft. and ____ in.

23. Mr. King bought a lawn swing that was marked \$12.50. The clerk told him that if he paid cash for it he would get 2% off the marked price. He paid cash. How much did he get off? How much did the swing cost him?

Review Work in Equivalent Fractions and Decimals

Change each of these decimals to a common fraction:

$$1. .25 = \frac{25}{100} = \frac{1}{?}$$

$$3. .40 = \frac{40}{?} = \frac{?}{?}$$

$$2. .75 = \frac{75}{100} = \frac{?}{?}$$

$$4. .80 = \frac{80}{?} = \frac{?}{?}$$

$$5. .33\frac{1}{3} = \frac{33\frac{1}{3}}{100} = 33\frac{1}{3} \div 100 = \frac{100}{3} \div 100 = \frac{100}{3} \times \frac{1}{100} = \frac{?}{?}$$

$$6. .62\frac{1}{2} = \frac{62\frac{1}{2}}{?} = 62\frac{1}{2} \div 100 = \frac{125}{2} \div 100 = \frac{125}{2} \times \frac{1}{100} = \frac{?}{?}$$

$$7. .12\frac{1}{2} = \frac{12\frac{1}{2}}{?} = 12\frac{1}{2} \div 100 = \frac{25}{2} \div 100 = \frac{25}{2} \times \frac{1}{100} = \frac{?}{?}$$

$$8. .87\frac{1}{2} = \frac{87\frac{1}{2}}{?} = 87\frac{1}{2} \div 100 = \frac{175}{2} \div ? = \frac{175}{2} \times \frac{1}{100} = \frac{?}{?}$$

$$9. .66\frac{2}{3} = \frac{66\frac{2}{3}}{?} = 66\frac{2}{3} \div ? = \frac{200}{3} \div ? = \frac{200}{3} \times \frac{1}{?} = \frac{?}{?}$$

$$10. .37\frac{1}{2} = \frac{37\frac{1}{2}}{?} = 37\frac{1}{2} \div ? = \frac{?}{2} \div ? = \frac{?}{2} \times \frac{1}{?} = \frac{?}{?}$$

Change each of these common fractions to a decimal:

$$11. \frac{1}{4} = 1.00 \div 4 = .25$$

$$13. \frac{1}{3} = 1.00 \div ? = .33\frac{1}{3}$$

$$12. \frac{2}{3} = 2.00 \div ? = .66\frac{2}{3}$$

$$14. \frac{1}{12} = 1.00 \div ? = .08\frac{1}{3}$$

$$15. \frac{1}{6} = 1.00 \div 6 = ? \text{ hundredths}$$

$$16. \frac{1}{8} = 1.00 \div ? = ? \text{ hundredths}$$

$$17. \frac{3}{8} = 3.00 \div 8 = ? \text{ hundredths}$$

$$18. \frac{5}{6} = 5.00 \div ? = ? \text{ hundredths}$$

$$19. \frac{3}{10} = 3.00 \div ? = ? \text{ hundredths}$$

$$20. \frac{7}{10} = 7.00 \div ? = ? \text{ hundredths}$$

Complete:

$$21. .50 = \frac{?}{?}$$

$$\frac{2}{3} = \frac{?}{100}$$

$$\frac{5}{8} = ? \text{ hundredths}$$

$$22. .75 = \frac{?}{?}$$

$$\frac{1}{3} = \frac{?}{100}$$

$$\frac{1}{12} = ? \text{ hundredths}$$

$$23. .16\frac{2}{3} = \frac{?}{?}$$

$$\frac{1}{8} = \frac{?}{100}$$

$$\frac{1}{6} = ? \text{ hundredths}$$

$$24. .10 = \frac{?}{?}$$

$$\frac{3}{8} = \frac{?}{100}$$

$$\frac{1}{4} = ? \text{ hundredths}$$

Bills and Receipts

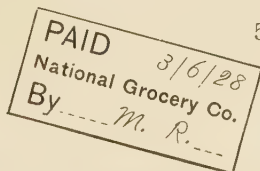
NATIONAL GROCERY CO.

GREENTOWN, VT.

In account with Mrs. L. V. Lester

537 Dean St.

Greentown, Vt.



Date Mar. 1, '28.

Phone: 783

Feb. 1	6 cans evaporated milk @ 10¢	60
Feb. 2	6 lb. prunes @ 3 lb. for 35¢	70
Feb. 15	3 lb. lima beans @ 12½¢	38
Feb. 23	2½ lb. steak @ 52¢	130
Feb. 26	1 package cereal	18
Total		316

1. Who sent this bill? To whom was it sent?
2. When did Mrs. Lester buy the goods?
3. Are there any mistakes in computing on the bill?
4. Has this bill been paid? How do you know?
5. When a bill has been marked "Paid," we say that it has been "receipted." What are the initials of the person who receipted this bill? When was the bill receipted?
6. The receipted bill is always returned to the buyer. Should the buyer keep it or destroy it? Why?
7. Mrs. Lester paid the bill by check. Her account is in the Farmers' Guarantee Trust Company of Greentown, Vermont. Make out a check like the one she sent.
8. Name five important things that a bill should show.

Bills — Discounts — Receipts

GEORGE C. MURPHY

Building Materials

Cameron and State Streets, Harrisburg, Pa.

Sold to Mr. J. M. Patton

June 1, 1929

416 West St.

Harrisburg, Pa.

1929				
May 4	12 bu. Lime @	.68	8 16	
	7000 lb. River Sand			
	per Ton	2.10	7 35	15 51
6	8 bags Cement @	.75	6 00	6 00
10	6000 lb. Stone			
	per Ton	2.00	6 00	
	2500 lb. White Sand			
	per Ton	6.80	8 50	14 50
Terms: 2% discount				36 01
if paid within 10 days				72
				35 29
<i>Recd. Paym't. 6/10/1929, M.C.H.</i>				

1. The above bill was sent by ____ to ____ on the ____ day of ____, 1929.

2. The first thing Mr. Patton did was to see if he had really bought all the goods with which he was charged, and then he checked the figuring. Can you find any mistakes in the amounts charged?

Bills — Discounts — Receipts

3. Where does the \$15.51 come from? the \$14.50?

4. Very often business houses reduce the amount of a bill for prompt payment. The amount by which the bill is reduced is called a *discount*. Mr. Murphy gives a 2% discount if the bill is paid within ten days. Where does Mr. Murphy tell Mr. Patton that fact?

5. Did Mr. Patton pay his bill within 10 days? How do you know?

6. What are the initials of the person who receipted Mr. Patton's bill?

7. Did Mr. Patton get the discount on his bill?

8. 2% of \$36.01 is ____.

9. Is the discount added or subtracted? Why?

10. Mr. Patton sent a check to Mr. Murphy in payment of this bill. His account is in the Commonwealth Trust Company, Harrisburg. Make out a check like the one Mr. Patton sent.

11. Have you any receipted bills at home on which a discount was allowed for prompt payment? If so, bring them to school and discuss them with the class.

12. Make out a bill that might be sent by a local furniture store to your mother. Allow her 2% for paying the bill within 30 days. How would the bill be receipted?

13. If, when you went to pay a bill to John R. Glass, Mr. Glass was not there but an assistant by the name of Samuel T. Brown took the money and receipted the bill for Mr. Glass, this is the way he would be likely to do it :

Received Payment

John R. Glass

per S. T. B.

What does "per S. T. B." mean?

Bills — Discounts — Receipts

SPEECEVILLE BRICK CO.

Speeceville, Pa., April 30, 1929

Sold to R. N. Bishop

537 W. 13th St.

Millersburg, Pa.

Trade Discount 20%

Terms: 1% for Cash (30 days)

DATE		QUANTITY	KIND	PRICE PER M	AMOUNT	
April	19	9800	Dark Red	\$17.00		
	24	12800	Scratch Face	25.00		
	26	12000	Salmon	14.00		

1. What does "Price per M" mean on the above bill?
2. How many thousand bricks are 9800 bricks?
3. Pretend that you are a clerk for the Speeceville Brick Company. How much would you fill in under the "Amount" column for the 9800 Dark Red bricks? for the 12,800 Scratch Face bricks? for the Salmon bricks?
4. What is the total of the bill?
5. Mr. Bishop is a builder and contractor. He buys a great many bricks from the Speeceville Brick Company. For that reason they give him a discount called a *trade discount*. The trade discount they give him is — — per cent.
6. The easiest way to find 20% of \$654.60 is to divide it by —.

Bills — Discounts — Receipts

7. How much does the trade discount on this bill amount to?
8. How much is the bill after the trade discount is subtracted?
9. If Mr. Bishop pays his bill on May 12, is he entitled to a 1% discount for paying cash? ("Paying cash" usually means paying within a reasonable time — in this case, 30 days.)
10. $.01 \times \$523.68 = \underline{\hspace{1cm}}$. Mr. Bishop was entitled to \$5.24 discount, because .2368 is nearer 24¢ than 23¢. (It is .0068 more than 23¢, but only .0032 less than 24¢.)
11. How much is the bill after that discount is subtracted?
12. Copy this bill, fill in the proper numbers in the "amount" column. Find the total amount. Deduct each discount. Receipt the bill.
13. Mr. Bishop's bank account is in the First National Bank at Millersburg, Pennsylvania. Make out a check like the one which he gave in payment of this bill.
14. Make out a bill for the following goods sold by the Standard Supply Co. of Chicago, Illinois, to Mr. R. S. Snyder, Druggist, 548 E. 125 St., New York City, on April 6, 1929.

3 doz. tubes Pearline Tooth Paste @ \$3.83 per doz.
3 doz. tubes Pepso Tooth Paste @ \$1.80 per doz.
2 doz. Sure-Clean Tooth Brushes @ \$3.75 per doz.
2400 Wooden Ice-Cream Spoons @ \$1.35 per M.
- The Standard Supply Company gives 2% discount for cash. The bill was sent on April 7 and paid on April 15. It also gives 25% trade discount.
15. Make out a check like the one Mr. Snyder sent in payment of this bill. His account is in the Merchants' Bank of New York City.
16. Bring some bills from home to show to the class and discuss with them.

Commission

1. Roy sold brushes last summer for the Cleaner Brush Company. He was allowed to keep 25% of the amount of his sales. The money that he kept is called his *commission*. Find (1) how much his sales amounted to during each of the four weeks he sold the brushes; (2) how much his commission amounted to each week; (3) how much he sent to the company each week after deducting his commission.

	PRICE	NUMBER SOLD			
		1ST WEEK	2D WEEK	3D WEEK	4TH WEEK
Nailbrush	\$.20	8			9
Vegetable Brush	.20	4	5	8	3
Toothbrush	.30	5	4	3	8
Scrubbing Brush	.65	2			
Hairbrush	.85	3	3	6	
Clothes Brush	.90	1	3	5	
Floor Brush	1.10		2		5
Wall Brush	1.50			4	

2. Mr. Allen has a house that he wants to sell. He has not been able to find a buyer; so he has asked a real-estate agent to sell the house for him. If the real-estate agent sells the house, he will charge a commission of 4% of the selling price in payment for his service. How much will Mr. Allen have to pay him if he sells the house for \$6000? for \$6500? for \$7000?

3. A real-estate agent sold 8 city lots for \$1850 each and received 5% commission. How much was his commission?

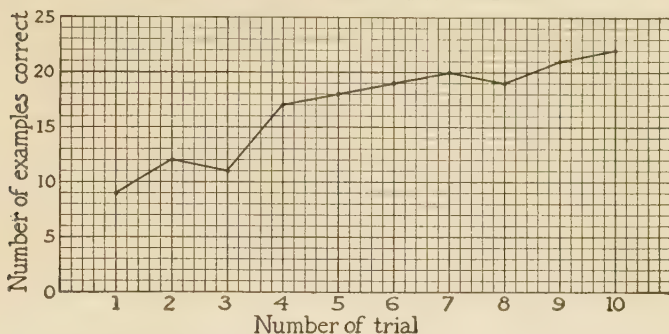
4. How much did the owner (Ex. 3) receive for the lots?

5. An agent sold 12 barrels of apples at \$2.75 a barrel. He charged 2% commission. How much did the owner of the apples receive for them?

Graphs

The following graph shows the number of examples Peter Byrd did correctly on each of 10 trials on an addition test.

PETER'S IMPROVEMENT IN ADDITION

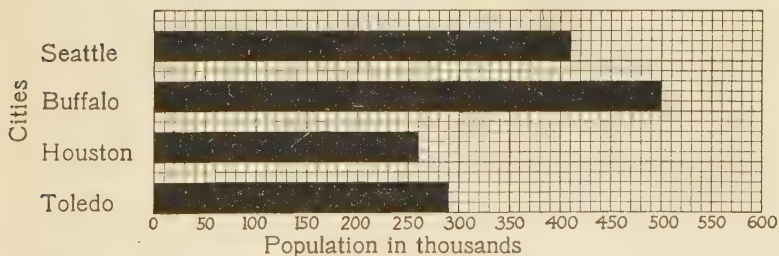


1. Refer to the graph and complete the table below.

Number of trial	1	2	3	4	5	6	7	8	9	10
Number of examples correct	9	12								

2. Name these four cities in the order of their size.

THE POPULATION OF FOUR LARGE CITIES, 1926



3. The horizontal scale tells the number of thousands; so 50 means 50,000; 100 means 100,000; etc. Where is 110,000?

4. About how many people were there in each of the cities?

The Meaning of Volume

1. This big, puffy marshmallow is 1 in. long, 1 in. wide, and 1 in. high. My brother said, "That marshmallow is 1 cubic inch."



2. I looked at the little tin box from which I had taken it and said, "Well, this box holds 18 marshmallows. If one marshmallow is 1 cubic inch, this box must contain ____ cubic inches."



3. The box is 6 inches long, 3 inches wide, and 1 inch high. Does such a box contain $6 \times 3 \times 1$ cu. in.? How many cubic inches is that?

4. If the box had been high enough for 2 layers of the marshmallows, how many marshmallows would there have been in the box? The box would then have been ____ in. long, ____ in. wide, and ____ in. high. It would contain $6 \times 3 \times$ ____ cu. in., or ____ cu. in.

5. If the box had been high enough for 3 layers of the marshmallows, it would contain ____ cu. in. How many cubic inches would it contain if it had been high enough for 4 layers? 5 layers?

6. A box 4 in. long, 2 in. wide, and 4 in. high holds ____ cu. in.

7. A brick 8 in. by 4 in. by 2 in. contains ____ cu. in.

8. A biscuit box is 9 in. long, 4 in. wide, and 2 in. high. How many cubic inches does it contain?

Find how many cubic inches there are in boxes with the following dimensions:

- | | | |
|--|--|--|
| 9. $4'' \times 8'' \times 2''$ | 12. $3\frac{3}{4}'' \times 3'' \times 3''$ | 15. $2\frac{1}{4}'' \times 3\frac{1}{2}'' \times 16''$ |
| 10. $5\frac{1}{2}'' \times 8'' \times 3''$ | 13. $5\frac{1}{2}'' \times 9'' \times 3''$ | 16. $2\frac{1}{3}'' \times 2\frac{1}{2}'' \times 5''$ |
| 11. $9'' \times 2\frac{1}{4}'' \times 8''$ | 14. $2\frac{1}{8}'' \times 3\frac{1}{2}'' \times 14''$ | 17. $2\frac{3}{4}'' \times 1\frac{1}{2}'' \times 4''$ |

18. Which is larger and how much, a box $5\frac{1}{2}'' \times 3\frac{1}{4}'' \times 2\frac{1}{3}''$ or one that is $4\frac{3}{4}'' \times 4\frac{1}{4}'' \times 2\frac{1}{2}''$?

The Meaning of Volume

1. This little wooden soap box that I use for a house for my pet mouse is 1 ft. long, 1 ft. wide, and 1 ft. high. It contains 1 cubic foot. Draw a box on the blackboard that contains 1 cubic foot.

2. A box 1 yd. long, 1 yd. wide, and 1 yd. high contains 1 cubic ____.

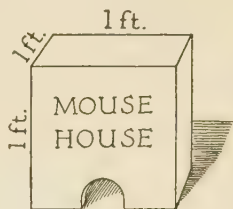
3. A shoe box holds more than a cubic ____, but less than a cubic ____.

4. A quart of brick ice cream is greater than a cubic ____, but less than a cubic ____.

5. A bushel basket holds less than a cubic yard, but a little more than a cubic ____.

6. Can you name anything the volume of which is about a cubic yard?

When you find how many cubic inches, cubic feet, or cubic yards an object contains, you are finding its *volume*.



To find the volume of a box-shaped object, multiply its length by its width by its height. (Always be sure its dimensions are expressed in the same units before you multiply.)

7. When you find the volume of a box $2' \times 3' \times 24''$, you must first change the 24 inches to ____ ft. The volume is ____ cu. ft.

Find the volumes of boxes which have the following dimensions:

8. $5'' \times 6'' \times 3''$

12. $3' \times 4' \times 6''$

9. $7' \times 8' \times 9'$

13. $3\frac{1}{4}' \times 2\frac{1}{2}' \times 16'$

10. $5 \text{ yd.} \times 7 \text{ yd.} \times 2 \text{ yd.}$

14. $2\frac{3}{4}' \times 1\frac{1}{3}' \times 8'$

11. $3' \times 2' \times 24''$

15. $5' \times 6' \times 1 \text{ yd.}$

An Oral Review

Tell the answers to these examples as quickly as you can:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1. 5% of 40	10% of 60	$16\frac{2}{3}\%$ of 36	25% of 16
2. $87\frac{1}{2}\%$ of 64	80% of 50	$62\frac{1}{2}\%$ of 64	$37\frac{1}{2}\%$ of 32
3. $8\frac{1}{3}\%$ of 48	$12\frac{1}{2}\%$ of 72	20% of 100	$33\frac{1}{3}\%$ of 48
4. 75% of 96	$66\frac{2}{3}\%$ of 33	60% of 45	50% of 20

Complete these sentences:

5. To find 200% of a number multiply the number by ____.
6. 175% of 240 is ____.
7. A 30-dollar overcoat bought at a discount of $33\frac{1}{3}\%$ costs ____ dollars.
8. A bill of \$60 less 5% for cash amounts to ____ dollars.
9. An agent who sells a 4000-dollar house at a 4% commission receives ____.
10. The volume of a tank $3' \times 4' \times 5'$ is ____ cu. ft.
11. The area of a rectangle $9' \times 14'$ is ____ sq. ft.
12. $.72 \div .9 =$ ____
13. $5 \times 1.5 =$ ____
14. $\frac{3}{4} + \frac{1}{2} =$ ____
15. $\frac{3}{8} \times \frac{1}{3} =$ ____
16. $\frac{1}{2} \div 2 =$ ____
17. $\frac{5}{8} - \frac{1}{4} =$ ____
18. When a bill has been marked "Paid" and signed by the person who received payment, we say that it has been ____.
19. "Paying cash" usually means paying a bill within ____ days after it has been sent.
20. Before a check can be cashed, it must be ____.
21. If Mr. Tuttle's bank balance is \$36.50 and he draws a check for \$30.00, his new balance is ____.
22. If Mr. Tuttle (Ex. 21) deposits \$50.00 the next day, his balance will be ____.

A Written Review

1. $\begin{array}{r} 47.02 \\ \times 50.89 \\ \hline \end{array}$	2. $\begin{array}{r} 82.44 \\ - 59.87 \\ \hline \end{array}$	3. $\begin{array}{r} 48.24 \\ 99.92 \\ 44.93 \\ 86.78 \\ \hline 92.84 \end{array}$	4. $\begin{array}{r} 8 \\ 9 \\ 9 \\ 6 \\ 5 \\ 9 \\ 4 \\ 9 \end{array}$
5. $\begin{array}{r} .4 \overline{)5.234} \end{array}$	6. $\begin{array}{r} .64 \overline{)4.956} \end{array}$		
7. $\begin{array}{r} 6 \overline{)7 \text{ hr. } 12 \text{ min.}} \end{array}$	8. $5 \times 3 \text{ ft. } 6 \text{ in.}$		

9. Find 35% of \$456.

10. The record for the javelin throw at Holbrook College was 69 ft. 7 in. Elizabeth Burton broke the record by throwing a javelin 70 ft. 3 in. How much farther did she throw it than it had ever been thrown at Holbrook College before?

11. When the Withers family opened up their summer cottage at Playfield, New York, on May 15, 1927, they ordered an electric fan for \$5.14, an oil stove for \$20.48, a garbage can for \$2.59, and 2 unpainted chairs for \$2.49 each. Make out the bill which The Home Supply Company of New York City sent them.

12. The Home Supply Co. gives a 2% discount if a bill is paid within ten days. Mr. Withers sent a check for the goods on May 21. Make out the check which he sent. (You may have his account in any bank you wish.)

13. An agent sold 8 barrels of potatoes at \$10 a barrel. He charged 2% commission for making the sale. After deducting the agent's commission, how much did the owner of the potatoes receive?

14. A cake recipe calls for $\frac{3}{4}$ cup of milk. How much milk would you need to make three of the cakes?

15. Harold received \$15 on his birthday. His father told him he would like him to put $\frac{4}{5}$ of it in the bank. Harold asked, "May I spend the other ____ dollars?"

Progress Test No. 4

Write only the answers to these examples on your paper. Number each answer. (Record your score.)

1. What per cent of this cake will you eat if you eat one of the equal pieces into which it is cut?



2. $37\frac{1}{2}\%$ of \$560 =

5. $16\frac{2}{3}\%$ of \$720 =

3. 6% of \$5820 =

6. 200% of \$500 =

4. $12\frac{1}{2}\%$ of \$350 =

7. 250% of \$500 =

8. If you buy a \$3.29 ice-cream freezer at a discount of 5%, how much will you have to pay for it?

9. Find the volume of a box $8\frac{1}{4}'' \times 14'' \times 12\frac{1}{3}''$.

10.
$$\frac{\frac{1}{4}}{\frac{1}{8} + \frac{9}{16}}$$

11. $\frac{5}{6} - \frac{3}{4}$

12. $1\frac{7}{8} \div 1\frac{2}{3}$

13.
$$\begin{array}{r} 5 \text{ ft. } 4 \text{ in.} \\ + 2 \text{ ft. } 9 \text{ in.} \\ \hline \end{array}$$

14. 1000×5.496

Write in figures:

15. Three million, three hundred thousand.

16. Five hundred forty and four hundred fifty-six millionths.

17. Tell how much this bill will amount to after it has been discounted: bill, \$8.75; discount, 15%.

18. How many towels $1\frac{1}{4}$ yd. long can be cut from 10 yd. of toweling?

Standards: X, 15. Y, 12. Z, 10.

CHAPTER V

PER CENTS

Finding What Per Cent One Number Is of Another

(1) One day in 1928 Billy and Tom were looking over this football record of their school. Billy said: "Our 1928 team is the best team our school ever had."

Tom said: "Oh! you are mistaken. Our team is not the best. It is true, we have won more games than the other teams,

YEAR	PLAYED	WON	LOST	YEAR	PLAYED	WON	LOST
1923 . .	8	6	2	1926 . .	12	9	3
1924 . .	10	5	5	1927 . .	10	8	2
1925 . .	9	3	6	1928 . .	16	12	4

but we had more chances to win, because we played more games than the others did. The only way we can tell which team has the best record is by finding out which team won the highest per cent of the games it played. Now, we won 12 out of 16 games; 12 is $\frac{12}{16}$ of 16, that is, 12 is $\frac{3}{4}$ of 16. But $\frac{3}{4}$ of a number is 75% of a number. So we won 75% of the games we played."

(2) Billy said: "I see. The 1923 team won $\frac{6}{8}$ of the games it played, or $\frac{3}{4}$ of them, which also equals 75% of the games played. The 1924 team won $\frac{5}{10}$ of its games or $\frac{1}{2}$, which equals ____%."

(3) Tom said: "That is right. The ____ team has the best record, having won ____% of the games it played. The ____ team has the poorest record, having won only ____% of its games."

(4) The 1923 team lost 2 out of the 8 games played, which is $\frac{2}{8}$ or $\frac{1}{4}$ of the games played. It lost ____ per cent of the games played. What per cent of its games did each team lose?

(5) In each case the per cent of the games won plus the per cent of games lost equals ____%, or all the games played.

Finding What Per Cent One Number Is of Another

(1) Then Billy and Tom looked up these basketball and baseball records of the school and decided to find which was the best team. What per cent of the games played did each team win?

YEAR	BOYS' BASKETBALL			GIRLS' BASKETBALL			BOYS' BASEBALL		
	Played	Won	Lost	Played	Won	Lost	Played	Won	Lost
1923 . .	12	8	4	5	0	5	12	5	7
1924 . .	10	6	4	6	3	3	9	8	1
1925 . .	10	7	3	7	3	4	7	6	1
1926 . .	9	7	2	7	4	3	10	7	3
1927 . .	6	6	0	9	5	4	11	9	2
1928 . .	9	5	4	11	6	5	8	6	2

(2) Tom said: "I am going to make a table that will show what per cent of the games a team won, no matter how many

TABLE SHOWING PER CENT OF GAMES WON

		<i>Number of Games Played</i>							
		5	6	7	8	9	10	11	12
Number of Games Won	5	100	$83\frac{1}{3}$		$62\frac{1}{2}$	$55\frac{5}{9}$	50		
	6		100		75	$66\frac{6}{9}$	60		
	7			100	$87\frac{1}{2}$	$77\frac{7}{9}$	70		
	8				100	$88\frac{8}{9}$	80		
	9					100			
	10								
	11								
	12								

games they played or how many of those they won. Then any one can find which is the best team by using my table.

(3) Look at the first row of the table. It shows that if a team won 5 games out of 5 played, it won ____% of the games played. If it won 5 games out of 6 played, it won $\frac{5}{6}$ or ____% of the games played. (Do you remember how to change $\frac{5}{6}$ to a decimal?

$$\frac{5}{6} = 5.00 \div 6 = .83\frac{1}{3}.)$$

(4) If a team won 5 out of 7 games, it won $\frac{5}{7}$, or ____%, of the games played. Copy and complete the table.

Finding What Per Cent One Number Is of Another

Below is a record of the success that some of the children in the Roxbury Poultry Club had with their "settings" of eggs last year.

NAME	NUMBER SET	NUMBER HATCHED	PER CENT HATCHED	NAME	NUMBER SET	NUMBER HATCHED	PER CENT HATCHED
Billy Story . .	45	36		Ruth Jones . .	60	52	
James King . .	35	25		Bob Fast . . .	50	40	
Albert Cox . .	40	38		Mark Coyne . .	38	15	
Mary Smith . .	25	25		Joe Walker . .	45	35	
Grace Leads . .	42	38		Florence Harvey	20	18	

(1) It is easy to see that $\frac{36}{45}$ (or $\frac{4}{5}$) of the eggs that Billy set hatched. What number should be written opposite Billy's name in the blank column?

(2) $\frac{25}{35}$ (or $\frac{5}{7}$) of the eggs that James set hatched. $\frac{5}{7}$ can be changed to a decimal like this: $\begin{array}{r} 7 \overline{)5.00} \\ \underline{.71\frac{3}{7}} \end{array}$; or like this: $\begin{array}{r} 7 \overline{)5.000} \\ \underline{.714^+} \end{array}$.

(3) We often use the first way (Ex. 2 above) to change a fraction to its equivalent decimal or per cent. We also often use the second way given above.

(4) If $\frac{5}{7}$ equals .714, we say that it equals 71.4%. (Do you see that when we read a decimal as a per cent, we really move the decimal point two places to the right?)

(5) We find that $\frac{5}{7} = .714^+$. Could we have carried the division farther if we wished? In examples like this we usually carry the decimal to three places and then stop dividing.

(6) What per cent of James King's setting hatched?

(7) What number belongs in the "Per Cent Hatched" column opposite the name of each of the other children?

Practice for Skill

Read these decimals as per cents:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>
1.	.28	.284	.29	.293	.72	.755	.80	.805
2.	.05	.053	.064	.456	.299	.08	.083	.003

3. To find what per cent 54 is of 172 divide ____ by ____.

4. To find what per cent 63 is of 192 divide ____ by ____.

5. 75 is what per cent of 89? (Divide ____ by ____)

6. 89 is what per cent of 98? (Divide ____ by ____)

7. 98 is what per cent of 89? (Divide ____ by ____)

8. 75 is what per cent of 70? (Divide ____ by ____)

“Watch your step” as you do these examples:

9. What per cent of 80 is 75? 16. 19 is what per cent of 36?
 10. What per cent of 73 is 64? 17. 19 is what per cent of 24?
 11. What per cent of 50 is 42? 18. 19 is what per cent of 19?
 12. What per cent of 36 is 32? 19. 19 is what per cent of 16?
 13. What per cent of 36 is 36? 20. 34 is what per cent of 36?
 14. What per cent of 36 is 42? 21. 36 is what per cent of 36?
 15. What per cent of 25 is 24? 22. 38 is what per cent of 36?

- | | |
|---|---|
| 23. $\begin{cases} 5\% \text{ of } 15 \text{ is what?} \\ \text{What per cent of } 15 \text{ is } 5? \end{cases}$ | 27. $\begin{cases} \text{What is } 4\% \text{ of } 40? \\ \text{What per cent of } 40 \text{ is } 4? \end{cases}$ |
| 24. $\begin{cases} 5\% \text{ of } 20 \text{ is what?} \\ 5 \text{ is what per cent of } 20? \end{cases}$ | 28. $\begin{cases} 5 \text{ is what per cent of } 50? \\ 5\% \text{ of } 50 \text{ is what?} \end{cases}$ |
| 25. $\begin{cases} \text{What per cent of } 24 \text{ is } 8? \\ \text{What is } 8\% \text{ of } 24? \end{cases}$ | 29. $\begin{cases} 6\% \text{ of } 60 \text{ is what?} \\ 6 \text{ is what per cent of } 60? \end{cases}$ |
| 26. $\begin{cases} 6 \text{ is what per cent of } 30? \\ 6\% \text{ of } 30 \text{ is what?} \end{cases}$ | 30. $\begin{cases} 5\% \text{ of } 60 \text{ is what?} \\ \text{What per cent of } 60 \text{ is } 5? \end{cases}$ |

Nearest Per Cent

1. One day a sixth-grade class had a test of 15 arithmetic examples. Miss Turner, the teacher, asked Doris and Lillian if they wanted to help her mark the papers. They said they did; so she made out this scoring card for them to use. It shows that if a paper has 15 examples correct, it is worth 100%; if it has 14 examples correct, it is worth 93%. How much is a paper worth if it has 13 examples correct? 12? 11? 10? 9? 8?

NUMBER OF EXAMPLES CORRECT	PER CENT
15	100%
14	93%
13	87%
12	80%
11	73%
10	67%
9	60%
8	53%

2. Doris said: "I believe you made a mistake in this chart, Miss Turner.

If a paper has 13 examples correct out of 15, when I divide 13 by 15 to find the per cent it is worth, I get .866 or 86.6%. Your chart says we are to give 87%, if there are 13 examples correct."

3. Miss Turner said: "Yes, Doris, 13 divided by 15 does give 86.6%, but I don't want to bother with tenths of one per cent so I am taking the nearest whole per cent. Now 10 divided by 15 gives 66.6%, but I have written it as 67%, because it is nearer to 67% than it is to 66%. 14 divided by 15 gives 93.3%. That is nearer to 93% than to 94%; so I have written 93% for that."

4. Miss Turner thought that every child in the room would get at least 8 examples correct. Doris found one paper on which there were only 7 examples correct. She marked that paper 47%. Was that what she should have marked it?

5. Lillian had a paper on which only 5 examples were correct. What per cent should that paper be marked?

Nearest Per Cent

1. Find the points on this scale that represent 1.5; 1.6; 2.1; 2.2; 3.6; 3.8.

2. Is 2.6 nearer to 2 or to 3?

3. Is 3.6 nearer to 3 or to 4?

4. Is 1.8 nearer to 1 or to 2?

5. Is 3.9 nearer to 3 or to 4?

6. To which whole number is each of these nearest?

3.6 4.8 5.9 4.2 7.8 8.5

Since 8.5 is just as near to 8 as it is to 9, we can take either number, but we usually take the 9. We would change 34.5% to 35%, in giving the nearest whole per cent.

7. Read these per cents to the nearest whole per cent :

8.9% 6.7% 50.5% 86.3% 80.1% 79.7%

Read these decimals to the nearest whole per cent:

8. .754 .753 .873 .986 .054 .095 1.632

9. .756 .755 .872 .543 .968 .077 .008

Find the answers to the nearest whole per cent:

10. 25 is ____% of 32.

11. What per cent of 40 is 17?

12. 18 is ____% of 19.

13. 19 is ____% of 23.

14. 24 is ____% of 56.

15. 38 is ____% of 27.

16. In the Wilson School there are 354 girls and 337 boys. What per cent of the total enrollment is girls? What per cent is boys? (Find the answers to the nearest whole per cent.)

17. This is the report of bread sales of a large bakery for one day. What per cent of the number of loaves of bread sold was white bread? whole wheat bread? brown bread? rye bread?

640	White Bread
275	Whole Wheat
215	Brown Bread
198	Rye Bread
1328	

Finding Per Cents of Increase and Decrease

1. James Martin has just taken a "job" which pays him \$16.00 a week. At the end of a year he is to get a "raise" of \$2.00 a week. \$2.00 is what per cent of \$16.00? James' salary will be increased ____%.

2. In other words James will start his second year with a salary of ____ dollars a week. If his salary is increased \$2.00 at the end of that year, it will be increased only $\frac{2}{16}$ or ____ per cent that year.

3. Then James will be starting his third year with a salary of ____ dollars a week. If his salary is increased \$2.00 at the end of that year, it will be increased only $\frac{2}{18}$ or ____ per cent.

4. Tom's pup, Fido, was only 8" high when Tom got him. Now he is 10" high. Fido's height has increased ____ inches, which is an increase of ____ per cent.

5. Jack's pup, Dart, weighed 10 lb. when Jack got him. Now he weighs only 8 lb. Dart's weight has decreased ____ pounds, which is a decrease of ____ per cent.

6. The weekly salaries of some men and boys for 1928 and 1929 are listed below. Find the per cent of increase or decrease in each case. (Express your answer in the nearest whole per cent.)

1928	1929	1928	1929	1928	1929
<i>a.</i> \$15	\$18	<i>h.</i> \$24	\$28	<i>o.</i> \$18.25	\$20.00
<i>b.</i> \$20	\$25	<i>i.</i> \$35	\$32	<i>p.</i> \$22.50	\$25.00
<i>c.</i> \$25	\$20	<i>j.</i> \$32	\$36	<i>q.</i> \$20.00	\$18.50
<i>d.</i> \$25	\$30	<i>k.</i> \$30	\$32	<i>r.</i> \$25.00	\$50.00
<i>e.</i> \$30	\$25	<i>l.</i> \$30	\$31	<i>s.</i> \$16.50	\$33.00
<i>f.</i> \$40	\$45	<i>m.</i> \$31	\$30	<i>t.</i> \$16.00	\$48.00
<i>g.</i> \$45	\$40	<i>n.</i> \$25	\$24	<i>u.</i> \$24.00	\$40.00

7. \$10 is what per cent of \$20? of \$30? of \$40? of \$50?

Per Cent Problems

1. Mr. Green earns \$200 a month. He pays \$40 a month for rent. What per cent of his income does he spend for rent?

2. He saves \$30 a month. What per cent of his income does he save?

3. He spends \$50 a month for household expenses. What per cent of his income goes for household expenses?

4. 28 of the 32 children in our class were present yesterday. What per cent of the class was present?

5. A sixth-grade class had an arithmetic test of 25 problems. Below are the numbers of problems some of the pupils did correctly. What mark (per cent) did each pupil make?

Ruth	18	Vera	13
Bertha	25	Jenny	23
George	20	Arthur	25
Harry	24	Earl	17
Roy	21	Harold	16
Mary	19	Josephine	18

6. Harry bought 15 copies of the *Popular Magazine* and has sold 10 copies. What per cent of his copies has he sold?

7. Martin bought 24 copies of the same magazine. He has sold 12 copies. What per cent of his copies has he sold?

8. If the magazines (Examples 6 and 7) cost 10¢ and sell for 15¢ each, has either of the boys collected more than he spent so far by selling the magazines?

9. Mr. Adams works at the Globe Department Store. He gets a 10% discount on everything he buys there. How much discount will he get on an overcoat that sells for \$40?

10. If Mr. Adams gets a \$4 discount on a \$40 overcoat, how much does the overcoat cost him?

Oral Practice with Per Cents

Complete these statements:

1. $12\frac{1}{2}\%$ of 40 is ____.
2. 4 is ____% of 16.
3. 5 is ____% of 20.
4. 5 is ____% of 40.
5. $37\frac{1}{2}\%$ of 64 is ____.
6. 6% of \$200 is ____.
7. 5% of 100 is ____.
8. $87\frac{1}{2}\%$ of 16 is ____.
9. 9 is ____% of 54.
10. 8 is ____% of 12.
11. 10% of 20 is ____.
12. 200 is ____% of 200.
13. 5% of 25 is ____.
14. 5 is ____ per cent of 25.
15. 125% of 36 is ____.
16. 10% of 4 is ____.
17. .258 is ____%.
18. .625 is ____%.
19. 8 is ____% of 80.
20. 80% of 20 is ____.
21. To find what per cent 60 is of 126, ____ by ____.
22. To find 60% of 126, ____ by ____.
23. What is 1% of 200? 10%? 100%?
24. 5% of 400 is ____; 50% of 400 is ____; 500% of 400 is ____.

(You may use a pencil to do the following problems.)

25. A National League team lost 62 of the 153 games they played one season. They won the other ____ games, which was ____ per cent of the games played.

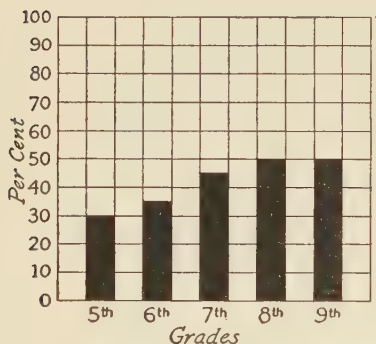
26. A man wishes to give to charity 15% of his estate, which is worth \$295,400. That means he will give ____ to charity.

27. A salesman sold \$28,000 worth of goods last year. He said that he wants to increase his sales 100% next year. He wants his next year's sales to amount to ____.

Graphs Showing Per Cents *

1. The Lincoln School publishes a weekly newspaper called

GRAPH SHOWING PER CENT OF PUPILS
BY GRADES WHO SUBSCRIBE TO THE
SCHOOL NEWS



School News. The school wants as many pupils as possible to subscribe for it; so they are having a drive this week to get subscribers. This graph shows what per cent of each grade had subscribed on Monday. Can you read the graph?

2. According to the table below how many pupils are there all together in the 5th grade of the Lincoln School? How many in the 6th grade? the 7th grade? the 8th grade? the 9th grade?

GRADE	5th	6th	7th	8th	9th
Total Number Pupils . . .	80	60	40	48	46
No. Subscribers Tuesday . .	24	24	28	31	27
No. Subscribers Wednesday .	33	32	31	32	32
No. Subscribers Thursday .	36	45	39	48	37
No. Subscribers Friday . .	42	54	40	48	41

3. According to the table how many 5th-grade pupils had subscribed to *School News* on Tuesday? How many 6th-grade pupils? 7th-grade? 8th-grade? 9th-grade?

4. What per cent of the 5th-grade pupils had subscribed by Tuesday? (What per cent of 80 pupils is 24 pupils?)

5. What per cent of the 6th-grade pupils had subscribed on Tuesday? (What per cent of 60 pupils is 24 pupils?)

Graphs Showing Per Cents *

6. What per cent of the 7th-grade pupils had subscribed by Tuesday? of the 8th-grade pupils? of the 9th-grade pupils?

7. The pupils extended the bars in the graph each day to show what per cent of each grade had subscribed up to that day. Using your answers to Exercises 4, 5, and 6, make a graph to show how their graph looked on Tuesday.

8. What per cent of the 5th-grade pupils had subscribed to *School News* by Wednesday? What per cent of the 6th grade? of the 7th grade? of the 8th? of the 9th?

9. Make a graph to show how the graph in the hall of the Lincoln School looked on Wednesday.

10. Make a graph to show how the graph looked on Thursday.

11. Make a graph to show how the graph looked on Friday.

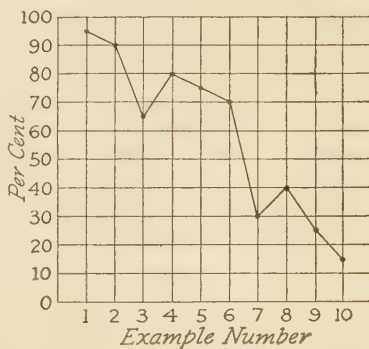
12. After an arithmetic test a 6th-grade teacher made this graph showing what per cent of her pupils solved each example on the test correctly.

Tell what per cent solved No. 1 correctly; No. 2, 3, etc., to No. 10.

13. From this graph the teacher can tell that her pupils need least practice on examples like Nos. ____ and ____, and most practice on examples like Nos. ____, ____, and ____.

14. If there were 40 pupils in the class (Ex. 12), how many pupils got the first example correct? the second example? each of the others?

GRAPH SHOWING PER CENT OF PUPILS SOLVING EACH EXAMPLE CORRECTLY



A Test

How many of these examples can you get right in 20 min.?

1. During the school year 1926-1927, 4500 school children in Schenectady, New York, deposited \$72,764.13. What was the average amount deposited by each child?

2. What is the area of a rectangle 6'' by 8''?

$$\begin{array}{r} 3. \quad 630.4 \\ \times 50.94 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 808.0 \\ - 597.8 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 5.43 \\ \times 100 \\ \hline \end{array}$$

6. Divide 9.671 by .8.

$$9. \quad 4.56 \overline{)10944}$$

7. Divide 84.62 by 7.

$$10. \quad 56.79 \div 1000$$

8. 3.496

11. $133\frac{1}{3}\%$ of 30 is ____.

4.609

12. What per cent of 40 is 8?

6.253

13. 100% of 753 is ____; 56%

8.684

of 753 is ____; 156% of 753 is ____.

6.638

14. What per cent of 336 is 210?

15. .278 is ____ per cent.

16. 2% is ____ hundredths.

17. If you get 17 of the 20 examples in this test correct, what per cent of the examples have you correct?

18. If some one in your class tells you he has 70% of these 20 examples correct, how many examples has he correct?

Find the next two answers to the nearest whole per cent:

19. Eleven of the thirty-one children in our schoolroom play tennis. What per cent of the children play tennis?

20. Nineteen of the thirty-one children in our schoolroom can swim. What per cent of the children can swim?

Gain and Loss

1. My uncle goes from house to house taking orders for electric appliances. I noticed that the electric sweepers he buys for \$20.00 he sells for \$30.00, and that the curling irons he buys for \$1.20 he sells for \$1.80.

2. I said to him : “How do you know how much to charge for each article? You don’t gain the same amount on each, for you gain ____ on each sweeper that you sell, and you gain only ____ on each curling iron.”

3. He said : “I sell each article so that I gain 50% of the cost. Each sweeper costs \$20.00. 50% (or $\frac{1}{2}$) of \$20.00 is _____. If it costs me \$20.00 and I want to gain \$10.00, I must sell it for _____.”

$$\text{Selling Price} = \text{Cost} + \text{Gain}$$

4. If he buys the curling irons for \$1.20 and wants to gain 50% of that, he wants to gain _____ cents. Therefore he must sell each curling iron for _____.

5. Below is a list of the costs of each of the other appliances he sells. Find out how much he gains on each. Find out how much he asks for each.

Irons	\$5.50	Fans	\$7.50
Table Stoves	\$2.50	Toasters	\$4.90
Flashlights	\$1.70	Washing Machines . . .	\$75.00

6. He had some small electric water heaters that nobody seemed to want to buy. He had paid \$1.50 for each of them. He decided that to get rid of them quickly he would sell them at a loss of 20%. 20% of \$1.50 is _____. If he sold them at a loss of 30¢, he sold them for _____.

$$\text{Selling Price} = \text{Cost} - \text{Loss}$$

Learning the Language of Business

1. Robert paid \$20 for Bruno, a German police puppy. After six months he sold Bruno for \$75. Is it possible, with this much information, to tell how much he *gained* (how much he made over and above all expenses)? Why not?

2. During the six months he spent \$18 for food, tax, a collar, and other expenses for Bruno. Now can you tell how much Robert gained? Why not?

3. Robert and his father figured that he had spent, on the average, an hour a day taking care of Bruno. They agreed that this time was certainly worth 10 cents an hour. What was the value of the time that Robert spent caring for Bruno? (Allow 30 days to a month.)

4. Should the value of the time that Robert spent caring for Bruno be counted as one of the expenses? Why so?

5. Now tell how much Robert *cleared* (gained).

6. What was Robert's *initial* (beginning) expense? What was his *total* expense? ("Total expense" is sometimes called the investment.) What was his gain or profit?

7. If Bruno had died at the end of six months, Robert would have *lost* the ____ dollars he had invested in Bruno.

8. Robert gained \$19 on an investment of \$56. What was his per cent of gain? (19 is what per cent of 56?) Do you consider this a very high per cent of gain?

9. Robert's profit was what per cent of the selling price?

(Most merchants try to sell their goods so that they clear from 5% to 10% of the selling price.)

10. A furniture dealer estimated that the total cost of a chair he had in stock was \$30. He sold the chair for \$40. His gain was ____ dollars. His gain was ____ per cent of the cost, but only ____ per cent of the selling price.

Gain and Loss

Tell what numbers belong in these blank spaces:

	COST IN DOLLARS	PER CENT OF GAIN	GAIN IN DOLLARS	SELLING PRICE		COST IN DOLLARS	PER CENT OF LOSS	LOSS IN DOLLARS	SELLING PRICE
1.	180	16 $\frac{2}{3}$	30	210	13.	120	50		
2.	500	20			14.	140		70	
3.	480	12 $\frac{1}{2}$			15.	400	62 $\frac{1}{2}$		
4.	40	20			16.	800			100
5.	72	37 $\frac{1}{2}$			17.	800			700
6.	120		30		18.	360	100		
7.	100			110	19.	720		240	
8.	400		50		20.	300	66 $\frac{2}{3}$		
9.	320			480	21.	160	75		
10.	250	100			22.	400			300
11.	250		50		23.	560		56	
12.	24			26	24.	240			192

25. Mr. Taylor, our grocer, bought a box containing 16 lb. of crackers for \$1.92. He wants to sell them for 25% more than he paid for them. How much does he want to get for the box of crackers?

26. How much will Mr. Taylor (Ex. 25) have to charge a pound for the crackers?

27. A soap agent said to Mr. Taylor, "Our soap costs you \$3.00 for this box of 50 cakes. That is ____ cents a cake. It retails for 8¢ a cake. Isn't ____ cents a cake a good margin?"

$$\text{Margin} = \text{Selling Price} - \text{Cost Price}$$

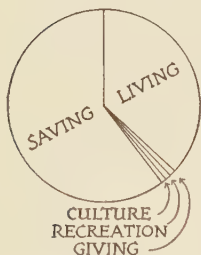
28. He had another kind of soap also that he offered Mr. Taylor for \$4.50 for 50 cakes. That retailed at 15¢ a cake. If Mr. Taylor bought that, he would have a margin of ____ cents a cake.

Good and Bad Budgets *



MR. THRIFT'S BUDGET

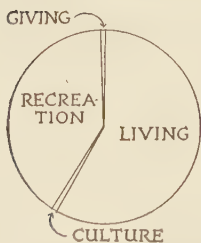
the per cents to the right of the graph mean? Do you think that it is reasonable that he should save 20% of his money?



MR. MISER'S BUDGET

1. Mr. Thrift has the income of an average American man. This circle graph shows how he spends it. What per cent of it does he use for living expenses? for recreation? for culture (books, lectures, travel, etc.)? for giving? for savings? What do

2. Some persons do not enjoy life as much as they should because they hoard all their earnings greedily. Mr. Miser is that kind of person. The list of per cents to the right of this graph shows you that he uses 60% of his salary for one thing. Can you tell from the graph how he uses 60% of his salary? 37%? 1%?



MR. SPENDTHRIFT'S BUDGET

3. Mr. Spendthrift's life is also poorly managed, but he is unwise in a different way from Mr. Miser. Can you tell from the graph and the list of per cents what per cent of his salary he saves? What per cent he uses for recreation? living expenses? culture? giving?

4. Suppose Mr. Thrift, Mr. Miser, and Mr. Spendthrift each earn \$3000 a year. How much does each use for living expenses? recreation? culture? giving? savings?

Safety First *

You all know what a lot of suffering and unhappiness is caused every year because people do not obey "Safety First" rules. Perhaps you have not thought so much about the expense connected with carelessness, however. The following examples show how thousands of dollars are wasted, through thoughtlessness.

1. Billy Jones and Bob Meyers built a fire to cook their supper when they were out on a hike. After they had eaten, they started for home, forgetting to put out the fire. The fire spread. The result was that a piece of timber land 120 rods long and 80 rods wide was burned. The timber was worth \$500 an acre; so the boys have through carelessness caused a loss of ____.

2. Mr. Speed's car refused to go one night. He thought it might be because he had no gasoline; so he struck a match to see how much gas he had. An explosion occurred, completely wrecking his car and injuring him. He was away from work 4 months. His salary was ordinarily \$250 a month, but he received only 40% of his salary while absent from work. How much did he lose in salary? His expenses for hospital and doctor were \$225; so that made a loss of ____.

3. But that wasn't all he lost. His automobile, which was completely destroyed, was worth \$1500. The insurance company paid him only $66\frac{2}{3}\%$ of its value; so he lost ____ on the car.

4. Mr. Speed had a total loss of ____ due to the accident.

5. The cost of educating each child in the schools of Los Angeles, California, is about 60¢ a day. Find the loss to the city if 4 schoolrooms of 32 pupils each had to be closed for a day to be fumigated because, when Mary Miller had scarlet fever, the other four Miller children came to school. (School expenses go on even though the school is closed.)

Getting Ready for the Progress Test

You may have all the time you need to do this test. The examples are not very hard.

1. $\frac{1}{2} + \frac{3}{4} =$
2. $5\frac{7}{12} + 8\frac{5}{6} =$
3. $\frac{3}{4} - \frac{9}{16} =$
4. $6\frac{2}{5} - 3\frac{1}{2} =$
5. $\frac{5}{6}$ of 92 =
6. $8 \times 2\frac{1}{4} =$
7. $\frac{2}{3} \times \frac{3}{4} =$
8. $\frac{1}{2} \div \frac{1}{4} =$
9. $2\frac{1}{2} \times 2\frac{1}{2} =$
10. $6\frac{1}{4} \div \frac{5}{6} =$
11. $9.28 - 5.643 =$
12. $4.25 \times 6.2 =$
13. $83.03 + 2.21 + 32.006 + .04$
14. Write as a common fraction: 25% $66\frac{2}{3}\%$ $87\frac{1}{2}\%$
15. Write as a decimal and as a per cent: $\frac{2}{5}$ $\frac{7}{20}$ $\frac{3}{4}$
16. $46.24 \div 12.3 =$
17. Write each of these fractions as a per cent: $\frac{1}{2}$ $\frac{3}{8}$ $\frac{4}{5}$
18. 35% of 40 =
19. 75 = ____% of 125
20. 21% of 424 =
21. $\frac{1}{4}$ of 13 gal. 2 qt. =
22. Add 9 bu. 2 pk., and 12 bu. 3 pk.
23. 5 times 12 lb. 4 oz. =
24. Subtract 3 yd. 2 ft. from 5 yd. 1 ft.
25. Find the average of 8, 9, 7, and 4.
26. 35 is what per cent of 48? (Find the nearest whole per cent.)
27. 43 is what per cent of 53? (Find the nearest whole per cent.)
28. Mr. Martin earns \$50 a week. He earns \$30 or ____ per cent of it as an insurance agent; he earns \$15 or ____ per cent of it by writing advertisements; the other ____ dollars, or ____ per cent of it, he earns as secretary of a club.
29. If skates marked \$4.50 are sold at a discount of 10%, how much will you have to pay for them?
30. Harry had 14 out of 15 examples correct in a test. What per cent of the examples did he do correctly?
31. Find the volume of a box $4' \times 3' \times 2'$.
32. Find the area of a rectangle $8'' \times 9''$.

Progress Test No. 5

Write only the answers to these examples on your paper. Number each answer. (Record your score.)

1. $.63 \div .9 =$

7. $16 \times 9\frac{1}{4} =$

2. $8\frac{9}{16} + 7\frac{5}{8} =$

8. $3\frac{1}{2} \times 2\frac{1}{5} =$

3. $\frac{3}{4} - \frac{2}{3} =$

9. $\frac{1}{2} + \frac{1}{5} =$

4. $8\frac{3}{16} - 2\frac{5}{8} =$

10. $4\frac{1}{2} + \frac{3}{4} =$

5. $\frac{7}{16} \times 4 =$

11. $6.24 \times 4.5 =$

6. $\frac{3}{5}$ of 64 =

12. $8.26 - 3.582 =$

13. $15.05 + 1.42 + 18.004 + .05 =$

14. Write as a common fraction: $37\frac{1}{2}\%$.

15. Write as a decimal and as a per cent: $\frac{1}{5}$ $\frac{3}{20}$ $\frac{5}{8}$.

16. 52% of 456 =

17. $48 = \text{---}\%$ of 64.

Express all answers to the nearest whole per cent in the following problems:

18. A team won 5 out of 12 games. What per cent of the games played did it win?

19. Harry bought a watermelon for 25¢ and sold it for 35¢. His gain was $\text{---}\%$ of the cost price.

20. Helen was 62 in. tall one year ago. Now she is 65 in. tall. What is the per cent of increase in her height?

21. If 24 out of 36 persons vote for an improvement, we say that $\text{---}\%$ of the people are in favor of it.

22. A dealer bought a piano for \$500. He wants to sell the piano at 30% above the cost, so he will have to charge --- for the piano.

Standards: X, 21. Y, 17. Z, 13.

CHAPTER VI

BUSINESS PRACTICE

Interest

(1) The boys in a club called "Our Gang" decided that they would like to have a cabin along Winding Creek, where they could hold club meetings all the year round. Jack Stone's uncle had a cabin which he said he would rent to the club for \$10 a month. In 1 year their rent would have amounted to ____; in 2 years to ____; in 3 years to ____; in 4 years to ____.

(2) Ted Fuller said: "Just think! In 5 years we would spend ____ for rent, and have nothing to show for it. I think it would be much more sensible to build a cabin of our own."

(3) Jack answered: "Well, of course I wish we could have a cabin of our own, too, but where could we get the money to buy the land and building materials? We have only \$300 in our treasury, and that wouldn't be nearly enough."

(4) Ted said: "Maybe we could borrow the money to build it, and then take the money we should have been spending for the rented cabin, to pay our debt. I'll find out about how much it would cost us to build a cabin."

(5) At the next meeting Ted announced that his father and he had figured that if the boys were willing to do most of the work, the club could build a cabin for \$800. Since they had \$300, that meant they needed ____ more.

(6) Ted's father told them he would lend them the money, but for the use of it they would have to pay him 6% interest. He said: "Interest means money paid for the use of money (like rent). You know 6% means $\frac{6}{100}$, so 6% interest means that each year that you keep the money you pay $\frac{6}{100}$ of the money. So for the use of the \$500 for a year you would owe me $\frac{6}{100}$ of \$500 or $.06 \times \$500$ which is \$____."

Interest

1. "Our Gang" voted to build the cabin. They borrowed the money immediately and set to work. At the end of the year the \$500 they had borrowed plus the interest amounted to ____ dollars. During the year they had earned \$180, which they paid toward their debt. Then they owed only ____.

2. At the end of the second year they figured that their interest was .06 times \$350 or ____, making their total debt _____. They had saved \$121 during the second year; so after they had paid that, they owed only ____.

3. At the beginning of the third year Ted said: "Let's see how much we can save in 6 months. Our interest on \$250 at 6% for 6 months would be only half as much as it would be for a year." Is that reasonable?

4. How much was their interest for 6 months? They saved \$100 during the 6 months, and paid it toward their debt; so they owed only ____ after that.

5. They paid off their debt at the end of the third year. How much did they pay in their last payment?

6. How much did the cabin cost them all together? How much more was that than they would have paid in rent during the three years?

7. Does the amount of money you pay for borrowing money (that is, the interest) depend upon (1) the amount of money you borrow? (2) the length of time you keep the money? (3) what you do with the money?

8. The Plainfield bank loaned Mr. Adams \$1000 for six months. The bank loaned Mr. Johnson \$2000 for six months. Mr. ____ should pay ____ times as much interest as Mr. _____. At 6% how much interest does each pay?

9. The interest on \$2500 for a year at 6% is ____.

The Language of Interest

1. On September 1, 1929, Harry borrowed \$200 from his sister so that he could complete his high school work. He agreed to pay her 6% of \$200 for the privilege of using the money one year. How much interest did he owe at the end of a year?

2. The \$200 (Example 1) is called the *principal*; the 6% is the *rate of interest*; the period during which he used the money is the *time* (in this case 1 year); and money paid (\$12) for the use of the principal is the *interest*. These are important names for you to remember.

3. If Harry had borrowed only \$150 for a year, his interest at 6%, would have been ____ dollars.

4. What would his interest have been if he had borrowed \$50? \$250? \$300? \$350?

5. I paid \$5 for the use of \$100 for a year. Can you tell what the *rate of interest* was? (\$5 is ____% of \$100.)

6. What is the rate of interest when \$4 is paid for the use of \$100 for a year? when \$4 is paid for the use of \$100 for half a year?

7. Can you tell what the rate of interest is when \$3 is paid for the use of \$50 for 1 year? What is the rate of interest when \$4 is paid for the use of \$50 for 1 year? when \$3.50 is paid for the use of \$50 for 1 year?

8. How much interest would you have to pay on each of these principals for 1 year?

(a) \$200 at 3%

(b) \$200 at 5%

(c) \$300 at 4%

(d) \$400 at 6%

(e) \$500 at 6%

(f) \$600 at 5%

9. The interest on \$200 for 1 year at 4% is ____; the interest on \$50 for 1 year at 4% is ____; the interest on \$250 for 1 year at 4% is ____.

Practice in Computing Interest

Tell what numbers belong in these blanks:

1. The interest on \$100 for 1 year at 4% is ____; for 2 years it is ____; for 6 mo. it is ____; for 3 mo. ($\frac{1}{4}$ yr.) it is ____; for 2 mo. ($\frac{1}{6}$ yr.) it is ____.

2. The interest on \$200 for 1 year at 6% is ____; for 2 years it is ____; for 6 mo. it is ____; for 4 mo. ($\frac{1}{3}$ yr.) it is ____; for 1 mo. ($\frac{1}{12}$ yr.) it is ____.

3. The interest on \$300 for 1 year at 8% is ____; for 6 mo. it is ____; for 4 mo. it is ____; for 3 mo. it is ____; for 2 mo. it is ____; for 1 mo. it is ____.

Are there any errors in the Interest columns?

PRIN.	RATE	TIME	INTEREST	PRIN.	RATE	TIME	INTEREST
4. \$400	6%	1 yr.	\$24.00	10. \$600	6%	6 mo.	\$60.00
5. \$400	6%	6 mo.	\$24.00	11. \$300	8%	4 mo.	\$6.00
6. \$800	4%	6 mo.	\$16.00	12. \$120	4%	2 mo.	\$24.00
7. \$500	5%	6 mo.	\$25.00	13. \$400	3%	1 mo.	\$1.00
8. \$700	6%	1 yr.	\$42.00	14. \$300	4%	1 yr.	\$7.50
9. \$600	7%	1 yr.	\$42.00	15. \$300	6%	3 yr.	\$58.50

Find the interest on each of the following:

PRINCIPAL	TIME	RATE	PRINCIPAL	TIME	RATE
13. \$700	1 yr.	8%	23. \$480	1 mo.	2%
17. \$800	6 mo.	4%	24. \$350	2 mo.	6%
18. \$600	2 yr.	4%	25. \$300	6 mo.	3%
19. \$400	4 mo.	2%	26. \$280	2 yr.	6%
20. \$650	6 mo.	4%	27. \$360	3 yr.	4%
21. \$720	4 mo.	3%	28. \$250	2 yr.	5%
22. \$480	2 mo.	5%	29. \$216	3 yr.	4%

Commission

1. An agent charged 3% commission for selling a house. He sold the house for \$3500. What was his commission? How much did the owner receive for the house? (The amount left after the commission is deducted is called the *net proceeds*.)

2. A collector charged 3% for collecting a debt of \$600. What was his commission? What were the net proceeds?

3. Here are some sales that an agent made. Find his commission on each sale and the net proceeds of each. How much did he earn in January? February? March? April?

JANUARY SALES		COM-MIS-SION	NET PRO-CEEDS	FEBRUARY SALES		COM-MIS-SION	NET PRO-CEEDS
a.	\$5000 at 2%			a.	\$2400 at 2%		
b.	\$500 at 1%			b.	\$300 at 2%		
c.	\$600 at 1%			c.	\$500 at 1%		
d.	\$1500 at 4%			d.	\$250 at 1%		
e.	\$1200 at 1%			e.	\$100 at 2%		
f.	\$300 at 2%			f.	\$320 at 1%		
g.	\$550 at 1%			g.	\$270 at 1%		
h.	\$600 at 1%			h.	\$1500 at 1%		

MARCH SALES		COM-MIS-SION	NET PRO-CEEDS	APRIL SALES		COM-MIS-SION	NET PRO-CEEDS
a.	\$1320 at 2%			a.	\$3000 at 3%		
b.	\$580 at 2%			b.	\$270 at 2%		
c.	\$760 at 3%			c.	\$840 at 3%		
d.	\$430 at 3%			d.	\$565 at 4%		
e.	\$290 at 1%			e.	\$295 at 6%		
f.	\$1860 at 1%			f.	\$436 at 2%		
g.	\$2460 at 1%			g.	\$2300 at 2%		
h.	\$3000 at 1%			h.	\$3300 at 3%		
i.	\$275 at 4%			i.	\$4620 at 1%		

Practice in "Pointing Off"

Tell where the decimal point should be placed in each of these products:

- | | |
|----------------------------|--------------------------------|
| 1. $3.2 \times 7.5 = 2400$ | 12. $.5 \times 5 = 25$ |
| 2. $4 \times 9.3 = 372$ | 13. $4.25 \times .5 = 2125$ |
| 3. $.02 \times 8.5 = 170$ | 14. $57.44 \times .06 = 34464$ |
| 4. $.30 \times .05 = 150$ | 15. $28 \times .75 = 2100$ |
| 5. $32 \times 3.2 = 1024$ | 16. $.04 \times 16.0 = 640$ |
| 6. $4.5 \times 4.5 = 2025$ | 17. $.03 \times .4 = 12$ |
| 7. $.01 \times 10 = 10$ | 18. $62.5 \times 11 = 6875$ |
| 8. $100 \times .02 = 200$ | 19. $.125 \times 400 = 50000$ |
| 9. $50 \times .4 = 200$ | 20. $8 \times .0625 = 5000$ |
| 10. $2 \times .2 = 4$ | 21. $.167 \times .01 = 167$ |
| 11. $3.0 \times 2.0 = 600$ | 22. $2 \times 3.1416 = 62832$ |

Tell where the decimal point should be placed in each of these quotients: (Supply zeros where needed.)

- | | |
|--|--|
| 23. $\begin{array}{r} 135 \\ 145 \overline{) 195.75} \end{array}$ | 30. $\begin{array}{r} 135 \\ .145 \overline{) 19575} \end{array}$ |
| 24. $\begin{array}{r} 135 \\ .145 \overline{) 19575} \end{array}$ | 31. $\begin{array}{r} 135 \\ 1.45 \overline{) 19575} \end{array}$ |
| 25. $\begin{array}{r} 135 \\ 145 \overline{) 1957.5} \end{array}$ | 32. $\begin{array}{r} 135 \\ .145 \overline{) 195.75} \end{array}$ |
| 26. $\begin{array}{r} 135 \\ 145 \overline{) 19575} \end{array}$ | 33. $\begin{array}{r} 135 \\ 1.45 \overline{) 19575} \end{array}$ |
| 27. $\begin{array}{r} 135 \\ 1.45 \overline{) 195.75} \end{array}$ | 34. $\begin{array}{r} 135 \\ .145 \overline{) 19575} \end{array}$ |
| 28. $\begin{array}{r} 135 \\ 145 \overline{) 195.75} \end{array}$ | 35. $\begin{array}{r} 135 \\ 145 \overline{) 19575} \end{array}$ |
| 29. $\begin{array}{r} 135 \\ 145 \overline{) 19575} \end{array}$ | 36. $\begin{array}{r} 135 \\ .145 \overline{) 19575} \end{array}$ |

Keeping Accounts

Harold Stern has been elected treasurer of the B.B.B. Club. He has to keep an accurate account of all the money he receives and all the money he spends. This is the account he kept the first month.

ACCOUNT OF B.B.B. CLUB

1929	MONEY RECEIVED			1929	MONEY SPENT		
May				May			
1	Bal. brot. for'd	11	55	2	Stamps		20
	Dues	2	50		Envelopes		25
15	Dues	5	00	15	Radio repairs	2	25
	Total received	19	05	21	Paint for canoe		2 00
				31	Bal. on hand	14	35
					Total		19 05
June							
1	Bal. brot. for'd.	14	35				

1. Harold became treasurer on May 1, 1929. On that date Dick Mann, the former treasurer, handed him \$11.55. How does Harold's account show that fact?

2. What does "Balance brought forward" mean?

3. Did Harold receive any other money on May 1? If so, how much?

4. How much did he receive all together during the month?

5. On what dates and for what purposes did he spend money during the month?

6. How much did Harold spend during the month? Did he receive more than he spent during the month?

7. How much money did Harold have "on hand" at the end of May?

Keeping Accounts

8. Should the money Harold spent, added to what he had left, equal the amount of money he received? Does his account show that it did? How?

9. When an account shows that the total amount of money received (including balance brought forward) is the same as the total amount of money spent added to the balance on hand, we say that the account "balances." If an account is kept correctly, should it always "balance"?

10. Has Harold started his June account? How?

11. Complete his June account for him. This is what happened during the month. On June 4 he received \$1.75 in dues and spent \$2.00 for a magazine subscription. On June 12 he sent a check for \$6.50 to the Sporting Goods Store for a tennis net. On June 21 he received \$3.00 in dues and spent \$2.98 for a "feed." He had \$7.62 in cash on hand on June 30. Does his account balance?

12. The B.B.B. Club keeps its money in a checking account at The People's Bank in Middletown, Illinois. Of course Harold pays all bills by check.

<i>No. 28 June 4, 1929</i>	
<i>To Pop. Magazine Co.</i>	
<i>For Year's Subscription</i>	
Bal. brought for'd	14 35
Amt. deposited	1 75
Total	16 10
Amt. this check	2 00
Bal. carried for'd	14 10

This stub shows that on the ____ day of ____ Harold deposited ____ to the credit of the club's account, making a total of ____ in the account. It shows that on the same day he sent a check to the Popular Magazine Company for ____ in payment for ____, leaving a balance in the account of ____.

13. Make a stub that will look like the stub in Harold's check book after he had sent the check for the tennis net (Ex. 11).

The B.B.B.'s Go Camping

1. The B.B.B. Club planned to go camping the first week in August. Sixteen boys were going. They decided that each boy should pay \$10.00 to the club to meet the camping expenses. That means that Harold was to get ____ from them all together.

2. At a meeting on July 17 Harold said: "Only 75% of you boys have paid your camping dues. In other words, I have received only ____ dollars so far."

3. On July 22 he told them that 14 out of 16 of the boys had paid. That meant he had collected ____ all together. He said he hoped to get the other ____ dollars as soon as possible.

4. This is a bill that Harold received for supplies. He found three mistakes in it. Can you find them?

NATIONAL GROCERY CO.

MIDDLETOWN, ILL.

Aug. 1, 1929

Sold to: B.B.B. Club, Harold Stern, Treas.

56 E. Main St., Middletown, Ill.

Aug. 1	16 loaves bread @ 9¢	1	34
	7 lb. bacon @ 50¢	3	50
	1 gal. syrup	1	00
	15 cans beans @ 3 for 25¢	1	25
	1 can cocoa		23
	5 lb. sugar		27
	30 cans soup @ 3 for 22¢	2	00
	8 lb. crackers @ 12¢ a lb.		96
	6 cans peaches @ 28¢ a can	1	78
	6 lb. prunes @ 3 for 20¢		40
		12	73
	2% off if paid within 10 days		

The B.B.B.'s Go Camping

5. After Harold had corrected the mistakes, he found the total of the bill to be ____.

6. Harold sent a check on August 2 in payment of this bill. Make out a check like the one Harold sent. (Harold didn't forget to take advantage of the discount.)

7. Harold had more work than usual keeping his account for August. Here are the facts his account had to show. Make out the account for him. He had \$178.50 left from July. Besides the bill mentioned in Example 6, he had the following business to record: On Aug. 3 he paid \$58.00 for a boat; on Aug. 5 he paid for 9 doz. eggs at 32¢ a doz.; on Aug. 8 he paid for 115 qt. of milk at 12¢ a quart; on Aug. 16 he paid a bill of \$53.39 at the General Store; on Aug. 18 he collected \$2.25 in dues and paid \$25.00 rent for the tents.

8. What balance should Harold have had on Sept. 1?

Practice with Per Cents

9. 25% of 80 = ____.

15. 400% of 500 = ____.

10. ____% of 48 = 16.

16. 40% of 500 = ____.

11. 4% of 40 = ____.

17. 4% of 500 = ____.

12. 6% of 1000 = ____.

18. .4% of 500 = ____.

13. ____% of 70 = 7.

19. .04% of 500 = ____.

14. $12\frac{1}{2}\%$ of 80 = ____.

20. $\frac{1}{2}\%$ of 1000 = ____.

21. Mrs. Stern wanted a coat marked \$60. She said, "If I wait another month, I think I'll be able to get one of those coats at a discount of $12\frac{1}{2}\%$." That means she thinks she will be able to get the coat for ____ dollars.

22. The Imperial Department Store allows its clerks a 6% discount on everything they buy. How much would a clerk have to pay for a hat that sold at \$5.98? a dress that sold at \$18.75?

Personal Accounts

1. Below is the account that Mr. Charles A. Brown kept of his personal money affairs during July. He counted his money and found that he had \$98.32 in money on hand on July 31. Does his account balance?

1929		MONEY RECEIVED		1929		MONEY SPENT	
July 1	Bal. bro't for'd	84	32	July 1	Doctor	25	00
" 2	Salary	150	00	" 5	Charity	2	50
" 6	Rent of house	35	00	" 7	Board and room	60	00
" 16	Salary	150	00	" 18	Suit	38	50
	Total			" 25	Savings	165	00
				" 30	Trip to Chicago	30	00
				" 31	Bal. on hand	98	32
					Total		

2. Following is a list of the receipts (money received) and expenditures (money spent) of Miss Charlotte Thompson for the month of August, 1929. All except salary are expenditures.

Aug. 1	Balance on hand	\$12.10
" 1	Salary	20.00
" 2	Dress	15.00
" 4	Board and room	9.00
" 5	Shoes mended	1.25
" 8	Salary	20.00
" 10	Savings	8.00
" 12	Board and room	9.00
" 15	Salary	20.00
" 19	Board and room	9.00
" 22	Recreation	10.00
" 25	Board and room	9.00
" 29	Salary	20.00

Show how her account looked at the end of the month. If her account balances, how much money should she have on hand on August 31?

Practice with Per Cents

Write each of the following in three forms (first as a *fraction* or *mixed number*, then as a *decimal*, then as a *per cent*) :

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>
1. $\frac{2}{5}$	$\frac{3}{4}$	.375	60%	1.25	$12\frac{1}{2}\%$	$\frac{7}{25}$	110%
2. 25%	.5	$62\frac{1}{2}\%$	$137\frac{1}{2}\%$	$\frac{7}{8}$	6%	1%	$\frac{1}{2}\%$

Find each of the following :

<i>a</i>	<i>b</i>	<i>c</i>
3. 50% of 64	20% of 40	$12\frac{1}{2}\%$ of 48
4. $33\frac{1}{3}\%$ of 30	40% of 60	$37\frac{1}{2}\%$ of 64
5. $66\frac{2}{3}\%$ of 48	60% of 60	$62\frac{1}{2}\%$ of 64
6. 25% of 72	80% of 15	$87\frac{1}{2}\%$ of 72
7. 75% of 16	$16\frac{2}{3}\%$ of 24	10% of 60
8. 3% of 40	2% of 80	9% of 60
9. 6% of 70	1% of 50	8% of 80

Complete each of the following :

10. 4 = ____% of 12. ____% of 30 = 9. ____% of 5 = 10.
 11. ____% of 25 = 5. 20 = ____% of 200. 8 = ____% of 12.
 12. ____% of 60 = 6. 7 = ____% of 7. 6 = ____% of 150.

Which of the following statements are true and which are false?

- | | | |
|------------------------------|-----------------------------|-----------------------------|
| 13. $3\frac{1}{2}\% = 3.5\%$ | 18. 250% = 2.5 | 23. $\frac{1}{2}\% = .005$ |
| 14. 3.5% = .35 | 19. .35 = 35% | 24. $\frac{1}{4}\% = .025$ |
| 15. 3.5% = .035 | 20. 1% = .01 | 25. 1.25 = $1\frac{1}{4}\%$ |
| 16. $3\frac{1}{2}\% = .035$ | 21. $2\frac{1}{2}\% = .025$ | 26. 1.25 = 125% |
| 17. $3\frac{1}{2}\% = .0035$ | 22. 2% = .02 | 27. 2.00 = 2% |

28. Mr. Green borrowed \$150 for 60 days (2 months) at 6% a year. How much interest did he have to pay for the use of the money?

Oral Review

1. $75 - 9 =$
2. $3.5 \times 2 =$
3. $8.4 + 7 =$
4. $.5 + .05 =$
5. $\frac{2}{3} \times \frac{1}{2} =$
6. $\frac{1}{2} + \frac{1}{6} =$
7. $100 \times 3.456 =$
8. $3.456 \div 10 =$
9. $\frac{1}{4} + \frac{3}{8} =$
10. $\frac{1}{6} + \frac{1}{3} =$
11. $\frac{1}{2} - \frac{1}{8} =$
12. $3 - \frac{3}{8} =$
13. $.045 \div .9 =$
14. $5 \text{ lb. } 8 \text{ oz. } + 9 \text{ oz. } =$
15. $.80 = \frac{?}{?}$
16. $.62\frac{1}{2} = \frac{?}{?}$
17. $\frac{2}{5} =$ ____ hundredths
18. $\frac{3}{8} =$ ____ hundredths
19. $\frac{5}{8} =$ ____ per cent.
20. $.16\frac{2}{3} = \frac{?}{?}$
21. $.12\frac{1}{2} = \frac{?}{?}$
22. $\frac{1}{12} =$ ____ per cent.
23. $.06 \times 400 =$
24. 6% of 250 =
25. 75% of 480 =
26. $37\frac{1}{2}\%$ of 64 =
27. 50% of 50 =
28. 27 is ____% of 45
29. 54 is ____% of 72
30. 18 is ____% of 30
31. $2 \times 3 \text{ hr. } 45 \text{ min. } =$
32. MC =
33. MD =
34. XC =
35. $.87 =$ ____ per cent.
36. $.875 =$ ____ per cent.
37. $.005 =$ ____ per cent.
38. 4% of 420 =
39. $.04 \times 420 =$
40. 75% of 800 is ____
41. 100% of 800 is ____
42. 200% of 800 is ____
43. 100% of 250 is ____
44. 150% of 250 is ____
45. $1\frac{1}{4}$ is ____ per cent.
46. 1.75 is ____ per cent.

Written Review

1. Find 18% of \$253.
2. Find the interest on \$475 for 1 year at 6%.
3. Find 125% of 48.
4. Mrs. Catherine Murphy bought a \$250.00 bedroom suite and a \$49.50 chair from the Chicago Home Furnishing Company on June 17, 1929. Make out the bill which was sent to her for the articles. (State on the bill that 2% discount is given if the bill is paid within 10 days.)
5. Make out a check like that which Mrs. Murphy sent in payment for the goods on June 25. (You may use the name of any bank.)
6. Make out the stub that remained in Mrs. Murphy's check book. (Before she made out this check, her balance was \$339.82.)
7. What is the largest number that can be written with the figures 3, 4, 2, and 9?
8. What is the difference between $\frac{7}{8}$ and $\frac{2}{3}$?
9. What is the product of $1\frac{3}{5}$ and $1\frac{3}{4}$?
10. What is the sum of $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$?
11. What is the quotient of $\frac{7}{8} \div \frac{21}{16}$?
12. Last year Mr. Smith bought a house for \$4000. He said, "I need money so badly for my business that I have to sell my house for what I can get for it, and that is only \$3500." Mr. Smith sold his house at a loss of ____ per cent.
13. A table marked \$30 is to be sold at a discount of 20%. The table will be sold at ____.
14. Mrs. Miller bought a remnant containing $6\frac{1}{8}$ yd. of toweling at 25¢ a yard. How much did the toweling cost?
15. Mrs. Miller said, "If I cut that remnant up into 7 towels, each will be ____ yd. long, and will cost ____."
16. Find the volume of a box 8'' by 6'' by 1''.

Progress Test No. 6

Write only the answers to these examples on your paper.
Number each answer. (Record your score.)

$$\begin{array}{r} 1. \quad 740.6 \\ - 649.7 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 3.097 \\ \times 26.08 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 5 \text{ ft. } 4 \text{ in.} \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 56.88 \\ 51.27 \\ 86.59 \\ 78.78 \\ \hline 64.97 \end{array}$$

$$\begin{array}{r} 5. \quad 4 \\ 8 \\ 7 \\ 6 \\ 8 \\ 8 \\ 3 \\ 5 \\ \hline \end{array}$$

$$6. \quad 8 \text{ ft. } 2 \text{ in.} + 3 \text{ ft. } 11 \text{ in.}$$

$$7. \quad 6 \text{ gal. } 3 \text{ qt.} \div 5$$

$$8. \quad 4 \text{ pk. } 2 \text{ qt.} - 1 \text{ pk. } 3 \text{ qt.}$$

$$9. \quad 50.19 \div .09$$

$$10. \quad 15625 \div 1.25$$

$$11. \quad .4 \times .22$$

12. Mr. C. P. Turner wishes to save $12\frac{1}{2}\%$ of his annual income of \$3600. How much does he wish to save each year?

13. What is the yearly interest on Mr. Turner's savings at 6%?

14. Louise solved 20 out of 25 problems correctly. What per cent did she solve correctly?

$$15. \quad 3\frac{1}{2} \times 2\frac{1}{5} = ? \quad 16. \quad 35\% \text{ of } 60 = ? \quad 17. \quad 7\frac{3}{4} + 3\frac{1}{2} = ?$$

18. 10 is what per cent of 16?

19. What is 130% of 200?

20. What is 60% of 45?

21. Write .625 as a per cent.

Standards: X, 18. Y, 15. Z, 12.

CHAPTER VII

MEASUREMENTS

A Judgment Contest

1. One afternoon the children in a sixth-grade room had a judgment contest. This is the way they did it: (1) The teacher drew a line on the board. (2) Each pupil wrote down the length he thought the line was. (3) One pupil measured the line to find its real length. (4) Each pupil found how much of an error he had made. (5) Each pupil found his per cent of error. (To find per cent of error, divide the error in length by the real length of the line.) (6) Each pupil found his average per cent of error. Here are Mary Bell's judgments on the 8 lines they judged. Copy and complete this table.

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>
Estimated length (inches)	4	8	16	17	24	4	$2\frac{1}{2}$	30
Real length (inches)	3	10	18	20	23	$4\frac{1}{2}$	$2\frac{3}{4}$	29
Error	1	2						
Nearest whole per cent of error	33	20						
Average per cent of error = ?								

2. When the line was only 3 inches long an error of 1 inch gave a per cent of error of 33%, but when the line was 30 inches long an error of 1 inch gave only ____ per cent of error? Why?

3. To find Mary's average per cent of error, add all her per cents of error and then divide the sum by ____.

Perhaps you would like to have a judgment contest. Do you think you could have a smaller average per cent of error than Mary's?

Problems in Measurement

1. Are you sure you know these facts?

$$144 \text{ sq. in.} = 1 \text{ sq. ft.}$$

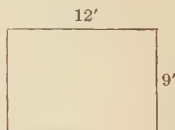
$$30\frac{1}{4} \text{ sq. yd.} = 1 \text{ sq. rd.}$$

$$9 \text{ sq. ft.} = 1 \text{ sq. yd.}$$

$$160 \text{ sq. rd.} = 1 \text{ acre}$$

$$640 \text{ acres} = 1 \text{ sq. mi.}$$

2. What are the dimensions of the rug represented by this rectangle? What is the area of the rug?



Find the areas of rectangles of the following dimensions:

3. $9' \times 15'$

6. $3\frac{1}{2}'' \times 4''$

4. $10'' \times 18''$

7. $2\frac{1}{3}' \times 3\frac{1}{4}'$

5. $3 \text{ yd.} \times 5 \text{ yd.}$

8. $8'' \times 2'$

9. If a board is 6 ft. long and 6 in. wide, could you find its area by doing this multiplication: $6 \times \frac{1}{2}$? The area of the board is ____ square ____.

10. Could you find the area of the board (Ex. 9) by doing this multiplication: 72×6 ? The area would be ____ square ____.

11. Is the result obtained for Example 9 the same as that for Example 10? Prove it.

12. Could you find the area of the board (Ex. 9) by doing this multiplication: 6×6 ? Why not?

Find the area of each of these rectangles:

13. $2 \text{ ft. } 3 \text{ in.} \times 30 \text{ in.}$

16. $9'' \times 4'$

14. $27 \text{ in.} \times 5 \text{ ft. } 6 \text{ in.}$

17. $18'' \times 5'$

15. $3 \text{ ft.} \times 3 \text{ ft. } 9 \text{ in.}$

18. $6 \text{ ft.} \times 4 \text{ ft. } 3 \text{ in.}$

19. To find the area of a rectangle, you must know the ____ and the ____ of the rectangle.

Drawing to Scale *

1. Letting $\frac{1}{8}$ in. stand for a foot, draw a picture of :

- (a) a rectangular garden $24' \times 40'$.
- (b) a rectangular dining-room table $5' \times 4'$.

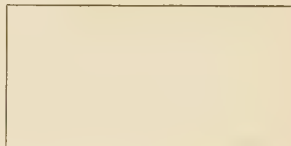
2. Letting $\frac{1}{2}$ in. stand for 1 mile, draw :

- (a) a road running $7\frac{1}{2}$ miles south, then $2\frac{1}{4}$ miles east.
- (b) a road running 3.5 miles west, then 2.25 miles north.
- (c) a park 3 miles square.

3. Letting a square $\frac{1}{2}$ in. on a side represent an acre, draw :

- (a) a square farm containing 4 acres.
- (b) a square farm containing 9 acres.

4. If a square $\frac{1}{4}$ in. on a side represents a square mile, how many square miles are there in the piece of land represented by this rectangle?



5. What will a line $1\frac{1}{2}$ in. long represent when the scale is 80 miles to an inch? 40 miles to an inch?

6. Measure the length and the width of the floor of your schoolroom. Choose a scale, and then draw a picture to represent the floor. Write down the scale you used.

7. Letting $\frac{1}{2}$ in. stand for a mile, what distance does a 5-inch line represent? a 10-inch line? a 12-inch line?

8. Letting .5 in. stand for a mile, how long a line would you draw to represent 4 miles? 8 miles? 9 miles?

9. Letting $\frac{1}{8}$ in. stand for 1 rod, how long a line would you draw to represent 10 rd.? 25 rd.? $\frac{1}{4}$ mile?

10. Letting $\frac{1}{4}$ in. stand for a mile, how long a line would you draw to represent 2 miles? 4 miles? 10 miles?

11. If $\frac{5}{8}$ in. stands for a mile, how many miles are represented by a $1\frac{1}{4}$ -inch line? by a 5-inch line?

Facts in Measurement

Tell how to complete each of the following sentences:

1. The area of a rectangle depends upon the ____ and ____ of the rectangle.
2. The volume of a box depends upon the ____, ____, and ____ of the box.
3. The common units of measure of length are the inch foot, . . .
4. The common units of measure of area are the square inch, . . .
5. The common units of measure of volume are the . . .
6. The common units of measure of weight are the . . .
(A unit called a hundredweight is sometimes used. It means 100 pounds.)
7. The common units of measure of liquid are the . . .
8. The common units of dry measure are the . . .
9. The common units of measure of time are the . . .
10. To find how many miles there are in 10,560 ft., ____ the 10,560 by ____.
11. To find how many square feet there are in 288 sq. in., ____ the 288 by ____.
12. To find how many square rods there are in 3 acres, ____ by 3.
13. One-fourth ton is ____ pounds.
14. 8 oz. is ____ of a pound.
15. There are ____ sq. in. in one square foot and ____ sq. ft. in one square yard.
16. The dimensions of a rectangular park are its ____ and ____.

Measurement

17. The dimensions of a box are its ____, ____, and ____.
18. There are ____ days in a year, and ____ days in a leap year.
19. The next leap year will be nineteen hundred ____.
20. There are 30 days in the months of ____, ____, ____, and ____.
21. February has ____ days, except in ____ ____, when it has ____.
22. If a scale of 1 in. to 6 miles is used in making a map, a line $2\frac{3}{4}$ inches long represents a distance of ____ miles.
23. If a line 10 inches long is increased 50%, it will be increased ____ inches and will then be ____ inches long.
24. If a farmer sells 25% of a 160-acre farm, he sells ____ acres and will have ____ acres left.
25. To find the number of cubic feet in a box $24'' \times 3' \times 2'$, you should first change 24 in. to ____.
26. 5×3 ft. 3 in. equals ____ ft. ____ in.
27. 7 gal. 3 qt. $\div 5$ equals ____ gal. ____ qt.
28. In order to find the area of a rectangle $6'' \times 3'$, you should either change the 6'' to ____ foot or the 3' to ____ in.
29. If you guess that a pumpkin weighs 6 lb. and you find when you weigh it that it really weighs 8 lb., the per cent of error of your guess is ____.
30. The perimeter of a square whose side is $3\frac{1}{8}$ in. is ____ in.
31. 5 gal. less 2 gal. 3 qt. leaves ____ gal. ____ qt.
32. There are ____ sq. rd. in an acre.
33. To change square rods to acres ____ by ____.
34. To change square miles to acres ____ by ____.
35. 3 ft. 6 in. + 1 ft. 8 in. equals ____ ft. ____ in.

Cubic Measure

1. Draw on the board a picture of a box $1' \times 1' \times 1'$. Its volume is ____ cubic foot.

2. Are the dimensions of the box you drew in Ex. 1 also $12'' \times 12'' \times 12''$? Then its volume is ____ cubic inches.

$$1 \text{ cubic foot} = 1728 \text{ cubic inches.}$$

3. Draw on the board a picture of a box $1 \text{ yd.} \times 1 \text{ yd.} \times 1 \text{ yd.}$ Its volume is ____ cubic yard.

4. Are the dimensions of the box you drew in Ex. 3 also $3' \times 3' \times 3'$? Then its volume is ____ cubic feet.

$$1 \text{ cubic yard} = 27 \text{ cubic feet.}$$

Find the volumes of boxes of the following dimensions:

5. $2' \times 3' \times 2'$

8. $4\frac{1}{2}'' \times 5'' \times 8''$

6. $4'' \times 3'' \times 6''$

9. $3\frac{1}{4}' \times 6\frac{1}{2}' \times 4'$

7. $3' \times 5' \times 4'$

10. $3'' \times 5' \times 4'$

11. If the dimensions of a tank are given as 4 ft., 3 ft. 3 in., and 18 in., could you find the volume by doing this multiplication: $4 \times 3\frac{1}{4} \times 1\frac{1}{2}$? (The volume would be ____ cubic ____.)

12. Could you find the volume of the tank (Ex. 11) by doing this multiplication: $48 \times 39 \times 18$? (The volume would be ____ cubic ____.)

13. Is the volume in Example 11 the same as the volume in Example 12? Prove it.

14. Could you find the volume (Ex. 11) by doing this multiplication: $4 \times 3\frac{1}{4} \times 18$? Why not?

Find the volumes of each of these cement blocks:

15. 2 ft. 3 in. $\times$ 30 in. $\times$ 2 ft.

18. $9'' \times 1\frac{1}{2}' \times 2'$.

16. 1 ft. 6 in. $\times$ 30 in. $\times$ 27 in.

19. $18'' \times 2' \times 1\frac{1}{3}'$.

17. 3 ft. 6 in. $\times$ 3 ft. $\times$ 2 ft.

20. $2' \times 3' 6'' \times 1\frac{1}{2}'$.

Problems in Measurement

1. A state law requires that every schoolroom be large enough to allow at least 300 cubic feet of air for each child in the room. How many children would the law permit in a schoolroom $24' \times 20' \times 18'$?

2. How many children would that state law allow to be placed in your schoolroom? How many cubic feet of air has each child in your schoolroom?

3. 280 sq. ft. = ____ sq. yd. (Carry to 2 decimal places.)

4. At 20¢ a square yard what is the cost of painting a floor $18' \times 16'$?

5. 350 cu. ft. = ____ cu. yd. (Carry to 2 decimal places.)

6. At \$1.75 a cubic yard what will it cost to dig a cellar $36' \times 18' \times 8\frac{1}{2}'$?

7. 2.3 cu. yd. of earth can be carted away in one truck load. How many trips would a truck have to make to cart away the earth from the cellar (Ex. 6)?

8. Find the cost of laying a hardwood floor in a room $18' 9'' \times 15'$ at 16¢ per sq. ft.

9. Mrs. Murphy is considering buying a refrigerator whose inside dimensions are $32\frac{1}{2}'' \times 17\frac{1}{2}'' \times 46''$, and also one whose inside dimensions are $26\frac{1}{2}'' \times 16\frac{1}{2}'' \times 50\frac{1}{2}''$. She wants the larger one. Which one should she take?

10. This advertisement appeared in a Denver newspaper:

Lowest Prices Ever Quoted on Linen Rugs!

	SIZE	PRICE		SIZE	PRICE
(1)	27×54	\$2.65	(3)	6×9	\$14.25
(2)	36×72	\$4.75	(4)	8×10	\$21.25

Which of the above rugs costs most a square foot? least a square foot? (Are the dimensions of the rugs all given in inches? How can you tell?)

Estimating Answers

When you solve any kind of example or problem, you should always examine the answer to see if it is reasonable. The examples and problems on this page are given so that you may have practice in estimating about what an answer should be. Estimate each answer. Then work each example or problem to see how nearly correct your estimate is.

- | | |
|---|------------------|
| 1. 26% of 481 (Think : $\frac{1}{4}$ of 480.) | 6. 102% of 1156 |
| 2. 34% of 601 (Think : $\frac{1}{3}$ of 600.) | 7. 51.5% of 2004 |
| 3. 11.1% of 2465 (Think : $\frac{1}{9}$ of 2465.) | 8. 1.1% of 2465 |
| 4. 79% of 2017 (Think : $\frac{4}{5}$ of 2000.) | 9. 74% of 2513 |
| 5. 63% of 5592 (Think : $\frac{5}{8}$ of 5600.) | 10. 13% of 6456 |

11. An agent receives a 12% commission. How much does his commission amount to on a sale of \$2405 worth of goods? (Remember, first estimate, then compute.)

12. A dealer bought a piano for \$549.75. He wants to sell it at a gain of 32%. For how much should he sell it?

13. A jeweler said he sold a \$125 ring at 19% below value. He must have sold it for ____ dollars.

14. What per cent is 24 of 76? is 49 of 98? is 39 of 159? is 101 of 25? is 25 of 101?

15. What per cent of 46 is 9? of 31 is 8? of 8 is 31? of 73 is 9? of 9 is 73?

16. Ted bought a bicycle for \$9.00. He spent \$2.95 on repairs for it. Then he sold it for \$15.00. What per cent did he gain on it?

17. An agent receives \$25.00 commission on every oriental rug he sells. A certain kind of rug sells for \$248.00. What per cent of the sale price does he receive as his commission?

Recipes

A recipe for cranberry sauce is as follows :

3 parts cranberries

2 parts water

1 part sugar

CRANBERRIES

WATER

SUGAR



1. If I use 3 cups of cranberries, how much water must I use? how much sugar?

2. If I use 3 pints of cranberries, how much water must I use? how much sugar?

3. If I use 1 quart of sugar, how much water must I use? how much cranberries?

4. If I use 2 cups of sugar, how much water must I use? how much cranberries?

5. How much water and how much cranberries must I use if I use 3 cups of sugar? 4 cups? 5 cups? 6 cups? 7 cups?

6. I must always use ____ times as much water as sugar, and ____ times as much cranberries as sugar.

7. How much water and how much sugar must I use if I use 6 cups of cranberries? 9 cups? 12 cups? 15 cups? 21 cups? 27 cups? 30 cups?

8. I must always use one ____ as much sugar as cranberries and ____ as much water as cranberries.

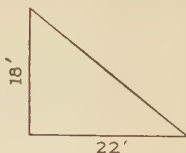
9. How much sugar and how much cranberries must I use if I use 2 cups of water? 4 cups? 6 cups? 8 cups? 10 cups? 3 cups? 5 cups?

10. I must always use one ____ as much sugar as water and $1\frac{1}{2}$ times as much cranberries as water.

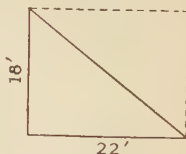
Right Triangles

(1) This drawing shows the shape and dimensions of Bill Atwood's father's garden. Mr. Atwood told Bill that he would pay him 2¢ a square foot for spading it.

Bill said, "I don't know how many square feet there are in the garden; so I can't tell how much I would earn by doing it." Do you know?



(2) Mr. Atwood said: "That is easy to find out. Suppose the garden were extended like this. Then there would be ____ square feet in it. But the real garden is only half as large as this; so there are only ____ square feet to be spaded. That means you would earn ____ by doing the work."



(3) Why did Mr. Atwood say the real garden was only half as large as this rectangular one?

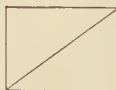


(4) All the above figures are *triangles*. A triangle is a figure with ____ sides.

(5) Notice that triangle *A* has a square corner. Find out which other triangles have square corners by seeing on which ones you can fit the square corner of a piece of paper.

(6) Triangles *A*, *D*, and *E* are called *right triangles*, because each has a *right angle* (square corner). Does triangle *B* have a right angle? Is it a right triangle?

(7) If you cut this figure into two pieces, like this, how many right triangles are formed?



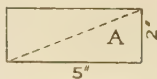
(8) Is the Atwoods' garden in the shape of a right triangle?

Right Triangles

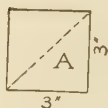
(1) Draw a rectangle 4'' by 3''. What is the area of the rectangle? Cut out the rectangle you have drawn and divide it into two pieces by cutting from corner to corner. Fit one triangle on top of the other. Are they the same size?

(2) Is the area of one of the right triangles one half the area of the rectangle? Since the area of the rectangle you drew was ____ sq. in., the area of one of the right triangles must be one half as much, or ____ sq. in.

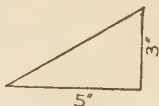
(3) The length of this rectangle is ____ in.; the width is ____ in.; the area is ____ sq. in.; the area of triangle *A* is ____ sq. in.



(4) The area of this square is ____ sq. in., and the area of triangle *A* is ____ sq. in.



(5) The area of the rectangle of which this triangle is a half is ____ sq. in.; so the area of this triangle is ____ sq. in.



In the triangle of Example (5) the 5-inch line is called the *base* and the 3-inch line is called the *altitude*.

(6) In the figure for Example (4) the base and the altitude of the square and of right triangle *A* are both ____ inches.

(7) In the figure of Example (3) the base of the rectangle and of right triangle *A* is ____ inches, and the altitude of each is ____ inches.

The base and the altitude of a right triangle (or rectangle) are the two lines which form the right angle. We usually think of the base as the line upon which the triangle or the rectangle stands and of the altitude as the height of the triangle or the rectangle.

(8) In Example (3) above is the area of the rectangle equal to the product of the base and the altitude?

(9) In Example (3) above is the area of triangle *A* equal to one half the product of the base and the altitude?

Right Triangles

The area of a right triangle is equal to one half the product of the base and the altitude.

1. Find the area of a rectangle whose base is 15'' and whose altitude is 8''.

2. Find the area of a right triangle whose base is 15'' and whose altitude is 8''.

Find the areas of the following right triangles:

BASE	ALTITUDE	BASE	ALTITUDE
3. 4 ft.	6 ft.	7. 3 ft. 6 in.	2 ft.
4. 4 in.	8 in.	8. 5 ft. 3 in.	4 in.
5. 3 yd.	5 yd.	9. 3 ft. 4 in.	6 in.
6. $5\frac{1}{2}$ in.	3 in.	10. 3 ft. 2 in.	2 ft. 6 in.

11. At \$60 an acre what is the cost of a farm in the shape of a right triangle whose base is 20 rods and whose altitude is 16 rods?

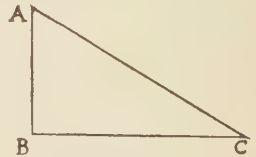
12. A baseball diamond is really a square, each side of which is 90 ft. Make a scale drawing of a baseball diamond, letting $\frac{1}{4}$ in. equal 10 ft.

13. Complete: A line from "home plate" to "second base" divides the baseball diamond into two ____ ____.

14. Using the scale drawing you make for Exercise 12, find how far it is from home plate to second base.

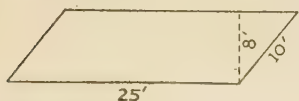
15. The area of a baseball diamond is what per cent of an acre? (1 acre = 43,560 sq. ft.)

16. In the right triangle shown here $AB = 30$ rods, $BC = 40$ rods, and $AC = 50$ rods. What is the area of the triangle in square rods? in acres?



Parallelograms

When George Young heard that Bill Atwood's father was paying him 2¢ a square foot for spading the garden, he asked his father to let him spade their garden, at the same rate of pay. He made this drawing. Then he measured the garden and said, "Our garden contains 10×25 , or 250 sq. ft.; so I would earn \$5.00."



His father didn't agree with him. Do you?

His father said: "If that little triangle of land at the right-hand end of the garden were cut off and fitted to the other end of the garden, then the garden would be in the form of a rectangle. Would the garden then be the same size as it is now?"



George said, "Yes, you changed the shape but not the size."

Father: Well, how many square feet would it contain?

George: There would be 8×25 , or ____ sq. ft., in the rectangle; so that must be the size of our garden, and I would get only ____ for doing the spading.

Parallel Lines

(1) Did you ever notice the rails of a railroad track? Are they



everywhere the same distance apart? Would you say they run in the same direction? What pairs of lines shown below appear



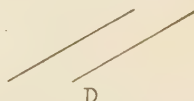
A



B



C



D

to be everywhere the same distance apart? Which ones would meet if extended?

Parallelograms

*Lines that are everywhere the same distance apart are **parallel**.*

(2) What pairs of lines shown on the preceding page are parallel? Point out some parallel lines in your classroom.

(3) Were there any parallel lines in George's garden? Which?

*If the opposite sides of a four-sided figure are parallel, the figure is called a **parallelogram**.*

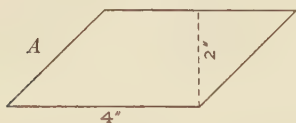
(4) Was George's garden a parallelogram?

(5) Which of these figures appear to be parallelograms?



(6) A parallelogram that has right angles is a ____.

(7) Do you think you could cut off the end of any parallelogram and fit it on to the other end to make a rectangle, as shown here?



(8) Is Figure *B* made up of the same two pieces as Figure *A*?

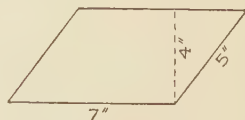
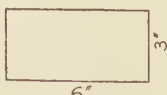
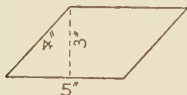
(9) Is the area of Figure *A* the same as the area of Figure *B*?

(10) What is the area of Figure *B*? of Figure *A*?

(11) How high is Figure *A*?

The height of a parallelogram is called its *altitude*.

(12) What is the length of the base and the altitude in each of these figures?



(13) What is the area of each of the figures in Ex. (12)?

Parallelograms

1. Complete: The area of a parallelogram is equal to the product of its base and its ____.

2. Find the areas of parallelograms of the following dimensions:

	BASE	ALTITUDE		BASE	ALTITUDE
a.	5'	3'	h.	5½"	4' 3"
b.	9"	2'	i.	3 yd.	6½ ft.
c.	5½'	2½'	j.	3½ yd.	2½ yd.
d.	3⅛"	2½"	k.	9 yd. 2 ft.	2 yd.
e.	3¾"	5⅓"	l.	4 yd. 1 ft.	1 ft.
f.	5' 4"	3'	m.	5 yd. 2 ft.	2 ft.
g.	4' 3"	3'	n.	3½ yd.	½ yd.

3. Which is larger and how much: (a) a right triangle whose base is 5' and whose altitude is 4½', or (b) a parallelogram whose base is 3' and whose altitude is 3⅔'?

4. Using a scale of ¼ in. to 1 yd. make a scale drawing of a right triangle whose base is 3 yd. and whose altitude is 4 yd. What is the area of the scale drawing? of the triangle itself?

5. Using a scale of ½ in. to 1 mi. make a scale drawing of a parallelogram whose base is 4 mi. and whose altitude is 2 mi. What is the area of the scale drawing? of the parallelogram itself?

6. Cut out the parallelogram you drew in Example 5 and compare it with those drawn by your classmates? Are they all the same size? the same shape?

7. Which is larger: (a) a rectangle whose base is 8 ft. and whose altitude is 4 ft., or (b) a parallelogram whose base is 4 ft. and whose altitude is 8 ft.?

8. Under what condition is a parallelogram a rectangle?

9. Pupils often have difficulty in measuring the altitude of a parallelogram. Make a drawing and show how to do it.

Written Review

- | | | | |
|--|---|--|---|
| 1. $\begin{array}{r} 4 \\ 9 \\ 4 \\ 8 \\ 7 \\ 9 \\ 5 \\ 7 \\ \hline \end{array}$ | 2. $\begin{array}{r} 3.496 \\ 4.609 \\ 6.253 \\ 6.884 \\ \underline{6.638} \end{array}$ | 3. $\begin{array}{r} 3.82 \\ .66 \\ 35.97 \\ .05 \\ \underline{67.99} \end{array}$ | 4. $\begin{array}{r} 309.7 \\ \times 26.08 \\ \hline \end{array}$ |
| | 5. $\begin{array}{r} 3.95 \\ \times 600 \\ \hline \end{array}$ | 6. $\begin{array}{r} 60.90 \\ - \underline{34.87} \end{array}$ | 7. $\begin{array}{r} 3.42 \\ - \underline{2.156} \end{array}$ |
| | | | 8. $\begin{array}{r} .8 \overline{)8.064} \end{array}$ |

9. Divide 8.4456 by 3.06.

10. Which of the rugs mentioned in this advertisement is being sold at the smallest price a square foot?

NOTE THESE PRICES FOR FIBER RUGS

8.3×10.6 feet . . . \$10.50	4.6×7.6 feet . . . \$5.00
7.6×10.6 feet . . . \$9.50	36×63 inches . . . \$2.50

11. Make out a bill for 35 yd. of awning material at 45¢ a yard, and $20\frac{1}{2}$ yd. of fringe at 10¢ a yard. Have the purchase made at a local store, and have the bill made out to be sent to your mother the first day of next month.

12. Find the volume of a box 3 ft. $\times$ 4 ft. 6 in. $\times$ 8 ft.

13. Find the interest on \$800 for 9 mo. at 4%.

14. An agent receives a commission of 25% on the goods he sells. How much commission does he get when he sells \$800 worth of goods?

15. My father bought 4 doz. sleds to sell last Christmas. He sold only 35 of them. What per cent of them did he sell? (Express to the nearest whole per cent.)

16. What per cent of the sleds mentioned in Example 15 did my father have left? (Express to the nearest whole per cent.)

Progress Test No. 7

Write only the answers to these examples on your paper. Number each example. (Record your score.)

$$\begin{array}{r} 1. \quad 6 \\ 8 \\ 9 \\ 5 \\ 7 \\ 4 \\ 8 \\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 9805 \\ \times 39.07 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 96.00 \\ - 86.93 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad .56 \\ 64.99 \\ .07 \\ 3.80 \\ \hline 43.43 \end{array}$$

$$5. \quad 9 \overline{)9.052}$$

$$6. \quad 4.63 \overline{)134.27}$$

$$7. \quad 62\frac{1}{2}\% \text{ of } 480$$

$$8. \quad 100\% \text{ of } 375$$

$$9. \quad 125\% \text{ of } 500$$

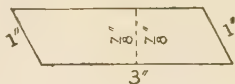
$$10. \text{ Add: } 1\frac{5}{8} + 2\frac{3}{4} + 5\frac{1}{2}$$

11. How many cubic feet of air are there in a room $30' \times 28' \times 12'$?

12. Find the area of the triangle represented by this drawing.



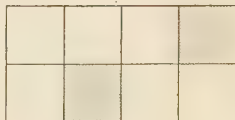
13. A coat marked \$36, if sold at a 10% discount, will sell for ____.



14. Find the area of the parallelogram represented by this drawing.

15. If you lend \$200 for 6 months at 6% interest, how much money should be paid you at the end of 6 months?

16. What per cent of this rectangle is shaded?



17. When you have covered 30 miles of a 150-mile trip, what per cent of the trip have you covered? What per cent remains to be covered?

18. Peggy had 500 envelopes to address for her father. She has finished 487. What per cent has she finished? (Express your answer as the nearest whole per cent.)

Standards: X, 16. Y, 13. Z, 11.

Finding Out What You Know and What You Don't Know

TEST I. ADDITION

- 7493
872
5684
987
5963
4885
9876
5894
- $289.5 + 645.94 + 27.93 + 87.6$
- $3\frac{3}{4} + 2\frac{2}{3} + 1\frac{1}{2}$
- 4 ft. 9 in. + 5 ft. 9 in.

TEST II. SUBTRACTION

- 850096
738459
- Subtract 295.8 from 349.
- $9\frac{1}{4} - 4\frac{5}{12}$
- $10 - 2\frac{7}{8}$
- How long is it from 1 : 45 P.M. to 5 : 10 P.M.?

TEST III. MULTIPLICATION

- 3897
98
- .0375
.05
- 1000×2.876
- $1\frac{7}{8} \times \frac{2}{3}$
- \$7.50
 $3\frac{3}{4}$
- 4 gal. 3 qt.
 $\times 5$

TEST IV. DIVISION

- $28 \overline{)168954}$
- $63 \div \frac{7}{9}$
- $.027 \overline{)291.6}$
- $.9 \overline{)081963}$
- Carry this division to two decimal places : $29 \overline{)675}$
- Change the fraction $\frac{7}{9}$ to a decimal.
- $28.96 \div 100$
- 8 yd. 2 ft. $\div 3$

TEST V. PERCENTAGE

Find

- 23% of 64.
- 60% of 270.
- $87\frac{1}{2}\%$ of 64.
- 250% of 98.
- Find the proceeds of a bill for \$75 after a 2% discount has been allowed.

Finding Out What You Know and What You Don't Know

6. Billy has sold 16 dollars' worth of magazines this week. He receives a 25% commission on his sales; so he has earned ____.

7. A baseball team won 17 of the 23 games it played. What per cent of its games did it win? What per cent did it lose? (Express answer to nearest whole per cent.)

8. Tom weighed 75 lb. on January 1. On July 1 he weighed 85 lb. During those six months his weight increased ____ per cent.

9. Harold bought a bicycle for \$8. He spent \$5 on it for repairs and then sold it for \$16. The total cost of the bicycle was ____; the gain was ____; the gain per cent was ____.

10. What is the interest on \$800 for 6 mo. at 5%?

11. Mary said, "Guess how old I am." I guessed that she was 11 years old, but she was only 10 years old. What was the per cent of error of my guess?

12. The directions on a bottle of mouth wash said: "Use 3 parts of water to 2 parts of this mouth wash." If I use 6 tablespoonsful of the mouth wash, how many tablespoonsful of water should I use?

If you failed any example on these tests, you can find by reading this chart where to get the practice you need. For instance, if you failed Example 1, Test I, you can find the practice you need on page 192.

TEST I	TEST II	TEST III	TEST IV	TEST V
1. p. 192 Addition Test 2. p. 202 3. p. 212 4. p. 264	1. p. 192 Subtraction Test 2. p. 203 3-4. p. 215 5. p. 266	1. p. 192 Multiplication Test 2. p. 205 3. p. 207 4. p. 219 5. p. 220 6. p. 268	1. p. 192 Division Test 2. p. 219 3-4. p. 227 5. p. 232 Exs. 1-7 6. p. 234 7. p. 239 8. p. 269	1. p. 274 2-3. p. 277 4. pp. 282-283 5. pp. 286-287 6. p. 290 7. pp. 297-298 8. p. 303 9. p. 311 10. p. 319 11. p. 331 12. p. 339

Progress Test Record

You should keep a record of your work in the Progress Tests, one of which is given at the end of each chapter. Make your record in the Progress Chart below or in one of the charts on the next page. The sample shows how to keep the record. For example, if in Test 1 your score on the first trial is below the *Z* standard, make a check mark in the column headed "*1st*" opposite the *F* (Failing), as shown in the sample. If on the second trial your score is equal to or above the *Z* standard but not so high as the *Y* standard, put a check mark in the 2d column opposite *Z*, as shown in the sample, etc.

SAMPLE			
Stand-ards	Trials		
	1st	2d	3d
<i>X</i>			✓
<i>Y</i>			
<i>Z</i>		✓	
<i>F</i>	✓		

Whenever you reach the *X* standard, you need not try the test again. But if you do not reach the *X* standard, you may take the test again until you have had three trials.

PROGRESS CHART

PROGRESS TEST 1				PROGRESS TEST 2				PROGRESS TEST 3				PROGRESS TEST 4			
Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials		
	1st	2d	3d		1st	2d	3d		1st	2d	3d		1st	2d	3d
<i>X</i>				<i>X</i>				<i>X</i>				<i>X</i>			
<i>Y</i>				<i>Y</i>				<i>Y</i>				<i>Y</i>			
<i>Z</i>				<i>Z</i>				<i>Z</i>				<i>Z</i>			
<i>F</i>				<i>F</i>				<i>F</i>				<i>F</i>			

PROGRESS TEST 5				PROGRESS TEST 6				PROGRESS TEST 7				PROGRESS TEST 8			
Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials		
	1st	2d	3d		1st	2d	3d		1st	2d	3d		1st	2d	3d
<i>X</i>				<i>X</i>				<i>X</i>				<i>X</i>			
<i>Y</i>				<i>Y</i>				<i>Y</i>				<i>Y</i>			
<i>Z</i>				<i>Z</i>				<i>Z</i>				<i>Z</i>			
<i>F</i>				<i>F</i>				<i>F</i>				<i>F</i>			

More Progress Test Records

Here are two more Progress Charts that can be used after the one on the preceding page. When these are used up, you will need to make one yourself.

PROGRESS CHARTS

PROGRESS TEST 1				PROGRESS TEST 2				PROGRESS TEST 3				PROGRESS TEST 4			
Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials		
	1st	2d	3d		1st	2d	3d		1st	2d	3d		1st	2d	3d
X				X				X				X			
Y				Y				Y				Y			
Z				Z				Z				Z			
F				F				F				F			

PROGRESS TEST 5				PROGRESS TEST 6				PROGRESS TEST 7				PROGRESS TEST 8			
Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials		
	1st	2d	3d		1st	2d	3d		1st	2d	3d		1st	2d	3d
X				X				X				X			
Y				Y				Y				Y			
Z				Z				Z				Z			
F				F				F				F			

PROGRESS TEST 1				PROGRESS TEST 2				PROGRESS TEST 3				PROGRESS TEST 4			
Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials		
	1st	2d	3d		1st	2d	3d		1st	2d	3d		1st	2d	3d
X				X				X				X			
Y				Y				Y				Y			
Z				Z				Z				Z			
F				F				F				F			

PROGRESS TEST 5				PROGRESS TEST 6				PROGRESS TEST 7				PROGRESS TEST 8			
Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials			Stand-ards	Trials		
	1st	2d	3d		1st	2d	3d		1st	2d	3d		1st	2d	3d
X				X				X				X			
Y				Y				Y				Y			
Z				Z				Z				Z			
F				F				F				F			

Tables of Measurement

LENGTH

12 inches (in.) = 1 foot (ft.)
3 feet = 36 inches = 1 yard (yd.)
 $5\frac{1}{2}$ yards = $16\frac{1}{2}$ feet = 1 rod (rd.)
320 rods = 5280 feet = 1 mile (mi.)

SURFACE

144 square inches (sq. in.) = 1 square foot (sq. ft.)
9 square feet = 1 square yard (sq. yd.)
 $30\frac{1}{4}$ square yards = 1 square rod (sq. rd.)
160 square rods = 1 acre (A.)
640 acres = 1 square mile (sq. mi.)

VOLUME

1728 cubic inches (cu. in.) = 1 cubic foot (cu. ft.)
27 cubic feet = 1 cubic yard (cu. yd.)
128 cubic feet = 1 cord

WEIGHT

16 ounces (oz.) = 1 pound (lb.)
100 pounds = 1 hundredweight (cwt.)
2000 pounds = 1 ton (T.)

TIME

60 seconds (sec.) = 1 minute (min.)	12 months = 1 year (yr.)
60 minutes = 1 hour (hr.)	365 days = 1 year
24 hours = 1 day (da.)	366 days = 1 leap year
7 days = 1 week (wk.)	10 years = 1 decade
30 days = 1 month (mo.)	100 years = 1 century

LIQUID MEASURE

2 pints = 1 quart (qt.)
4 quarts = 1 gallon (gal.)

DRY MEASURE

2 pints (pt.) = 1 quart (qt.)
8 quarts = 1 peck (pk.)
4 pecks = 1 bushel (bu.)

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